March 13, 2026

PROJECT MANUAL

PROCESS TECHNOLOGY BUILDING EXPANSION

for SOWELA TECHNICAL COMMUNITY COLLEGE
Louisiana Community and Technical College System

3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana 70615

SOWELA Foundation Project No.: 2026-01
C.E.H. Project No.: 2506

SOWELA TECHNICAL COMMUNITY COLLEGE

LCTCS

CHAMPEAUX EVANS HOTARD
ARCHITECTS

WILLIAM B. EVANS
Reg. No. 8846
STATE OF LOUISIANA
REGISTERED ARCHITECT

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INVITATION TO BID

for

PROCESS TECHNOLOGY BUILDING EXPANSION
for SOWELA Technical Community College
Louisiana Community and Technical College System
3500 Senator J. Bennett Johnston Ave., Lake Charles, LA 70615

SOWELA Technical Community College Foundation Project No.: 2026-01

The following Contractors are the Invited Bidders for this project:

Alfred Palma, L.L.C.
Arkel Constructors, L.L.C.
Pat Williams Construction, L.L.C.
Trahan Construction, L.L.C.

Sealed bids will be received by the SOWELA Technical Community College Foundation, and shall be directed to the attention of Adam Reed, SOWELA Executive Director of Facilities and Campus Operations, 3820 Senator J. Bennett Johnston Ave. Suite 109, Lake Charles, LA 70615.

The deadline for receipt of bids is 4:00 PM on Monday, May 25, 2026 Sealed Bids shall be received and opened publicly, at the SOWELA Regional Training Center, 2nd Floor, Executive Conference Room 204, 3749 Senator J. Bennett Johnston Ave., Lake Charles, LA 70615.

Complete Bid Documents for this project are available in electronic form, and may be obtained without charge and without deposit from the office of the Architect, Champeaux Evans Hotard, APAC. Printed copies are not available from the Designer, but Bidders can make arrangements to obtain printed copies through most reprographic firms. Plan holders are responsible for their own reproduction costs. Questions about this procedure shall be directed to the Designer at:

Champeaux Evans Hotard, APAC
702 Dr. Michael Debakey Drive, Lake Charles, LA 70601
Contact: Brad Evans, Principal Architect
Email: brad@champeaux.biz
337-439-8871

All bids shall be accompanied by bid security in an amount of five percent (5.0%) of the sum of the base bid and all alternates. The form of this security shall be as stated in the Instructions to Bidders and shall utilize the Bid Bond Form included in the Project Manual / Bid Documents for this project.

The successful Bidder shall be required to furnish a Performance and Payment Bond written as described in the Instructions to Bidders included in the Bid Documents for this project.

A MANDATORY PRE-BID CONFERENCE WILL BE HELD at 2:00 p.m. on Monday May 4, 2026 at the project site, SOWELA Process Technology Building, 3500 Senator J. Bennett Johnston Ave, Lake Charles, LA 70615.

Bids shall be accepted from Contractors who are licensed under LA. R.S. 37:2150-2192 for the classification of **Building Construction**. Bidder is required to comply with provisions and requirements of LA R.S. 38:2212(B)(5). No bid may be withdrawn for a period of forty-five (45) days after receipt of bids, except under the provisions of LA. R.S. 38:2214.

The Owner reserves the right to reject any and all bids for just cause. In accordance with La. R.S. 38:2212(B)(1), the provisions and requirements of this Section; and those stated in the bidding documents shall not be waived by any entity.

When this project is financed either partially or entirely with State Bonds or financed in whole or in part by federal or other funds which are not readily available at the time bids are received, the award of this Contract is contingent upon the granting of lines of credit, or the sale of bonds by the Bond Commission or the availability of federal or other funds. The State shall incur no obligation to the Contractor until the Contract Between Owner and Contractor is fully executed.

If you have a disability and would like to request an accommodation in order to participate in these meetings, please contact Adam Reed, SOWELA Executive Director of Facilities and College Operations at adam.reed@sowela.edu or (337)794-7343, as soon as possible, but no later than 48 hours before any scheduled meeting.

April 27, 2026

INSTRUCTIONS TO BIDDERS

COMPLETION TIME:
The Bidder shall agree to fully complete the Contract work within the following times:

Base Bid contract work within 400 consecutive calendar days
Alternate No.1 contract work (if accepted) ADD 0 Days
Alternate No.2 contract work (if accepted) ADD 90 Days
Alternate No.3 contract work (if accepted) Add 0 Days

subject to such extensions as may be granted under Paragraph 8.3, in the General Conditions and the Supplementary Conditions, and acknowledges that this construction time will start on the date specified in the written "Notice to Proceed" from the Owner.

LIQUIDATED DAMAGES:
The Bidder shall agree to pay as Liquidated Damages the amount of **One Thousand Dollars and no/100 ($1,000.00)** for each consecutive calendar day for which the work is not complete, beginning with the first day beyond the contract completion date stated on the "Notice to Proceed" or as amended by change order.

TAX EXEMPTION:
This project **WILL NOT** be exempt from applicable state and local sales and use taxes imposed by taxing authorities. The successful contractor / subcontractors shall include applicable sales and use taxes in the Bid amount.

ARTICLE 1

DEFINITIONS

1.1 The Bid Documents shall include the following:

Advertisement for Bids
Instructions to Bidders
Bid Form
Bid Bond Form
General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition
Supplementary Conditions
Contract Between Owner and Contractor and Performance and Payment Bond and Non-Collusion Affidavit
Attestations Affidavit – 10 day document
User Documents (if applicable)
Pre-Construction Conference Agenda
Schedule of Values
Change Order Form
Recommendation of Acceptance
Partial Occupancy Form
Building Plaque *(if applicable)*
Asbestos Abatement (if applicable)
Other Documents (if applicable)
Specifications & Drawings
Addenda issued during the bid period to be acknowledged on the Bid Form

1.2 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201 and the Supplementary Conditions are applicable to the Bid Documents.

1.3 Addenda are written and/or graphic instruments issued by the Designer prior to the opening of bids, which modify or interpret the Bid Documents by additions, deletions, clarifications, corrections and prior approvals.

1.4 A bid is a complete and properly signed proposal to do the work or designated portion thereof for the sums stipulated therein supported by data called for by the Bid Documents.

1.5 Base bid is the sum stated in the bid for which the Bidder offers to perform the work described as the base, to which work may be added, or deleted for sums stated in alternate bids.

1.6 An alternate bid (or alternate) is an amount stated in the bid to be added to the amount of the base bid if the corresponding change in project scope or materials or methods of construction described in the Bid Documents is accepted.

1.7 A Bidder is one who submits a bid for a prime Contract with the Owner for the work described in the Bid Documents.

1.8 A Sub-bidder is one who submits a bid to a Bidder for materials and/or labor for a portion of the work.

1.9 Where the word "Architect" is used in any of the documents, it shall refer to the Designer of record of the project, regardless of discipline.

ARTICLE 2

PRE-BID CONFERENCE

2.1 A Pre-Bid Conference shall be held at least 10 days before the date for receipt for bids. The Designer shall coordinate the setting of the date, time and place for the Pre-Bid Conference with the User and shall notify, in writing, the Owner and all who have received sets of the Bid Documents to attend. The purpose of the Pre-Bid Conference is to familiarize Bidders with the requirements of the Project and the intent of the Bid Documents, and to receive comments and information from interested Bidders. If the Pre-Bid Conference is stated in the **Invitation To Bid** to be a Mandatory Pre-Bid Conference, bids shall be accepted only from those Bidders who attend the Pre-Bid Conference. Bidders who are not in attendance for the entire Pre-Bid Conference will be considered to have not attended.

2.2 Any revision of the Bid Documents made as a result of the Pre-Bid Conference shall not be valid unless included in an addendum.

ARTICLE 3

BIDDER'S REPRESENTATION

3.1 Each Bidder by making his bid represents that:

3.1.1 He has read and understands the Bid Documents and his bid is made in accordance therewith.

3.1.2 He has visited the site and has familiarized himself with the local conditions under which the work is to be performed.

3.1.3 His bid is based solely upon the materials, systems and equipment described in the Bid Documents, as advertised and as modified by addenda.

3.1.4 His bid is not based on any verbal instructions contrary to the Bid Documents and addenda.

3.1.5 He is familiar with Code of Governmental Ethics requirement that prohibits public servants and/or their immediate family members from bidding on or entering into contracts; he is aware that the Designer and its principal owners are considered Public Servants under the Code of Governmental Ethics for the limited purposes and scope of the Design Contract with the State on this Project (see Ethics Board Advisory Opinion, No. 2009-378 and 2010-128); and neither he nor any principal of the Bidder with a controlling interest therein has an immediate family relationship with the Designer or any principal within the Designer's firm (see La. R.S. 42:1113). Any Bidder submitting a bid in violation of this clause shall be disqualified and any contract entered into in violation of this clause shall be null and void.

3.2 The Bidder must be fully qualified under any State or local licensing law for Contractors in effect at the time and at the location of the work before submitting his bid. In the State of Louisiana, Revised Statutes 37:2150, et seq. will be considered, if applicable.

The Bidder shall be responsible for determining that all of his Sub-bidders or prospective Subcontractors are duly licensed in accordance with law.

ARTICLE 4

BID DOCUMENTS

4.1 Copies

4.1.1 The Designer shall provide the Bid Documents in electronic format. They may be obtained without charge and without deposit as stated in the Advertisement for Bids.

4.1.2 Printed copies will not be available from the Designer, but arrangements can be made to obtain them through most reprographic firms and/or plan rooms. All plan holders are responsible for their own reproduction costs.

4.1.3 Complete sets of Bid Documents shall be used in preparing bids; neither the Owner nor the Designer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.

4.1.4 The Owner or Designer in making the Bid Documents available on the above terms, do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.

4.2 Interpretation or Correction of Bid Documents

4.2.1 Bidders shall promptly notify the Designer of any ambiguity, inconsistency or error which they may discover upon examination of the Bid Documents or of the site and local conditions.

4.2.2 Bidders requiring clarification or interpretation of the Bid Documents shall make a written request to the Designer, at least seven days prior to the date for receipt of bids.

4.2.3 Any interpretation, correction or change to the Bid Documents will be made by addendum. Interpretations, corrections or changes to the Bid Documents made in any other manner will not be binding and Bidders shall not rely upon such interpretations, corrections and changes.

4.3 Substitutions

4.3.1 The materials, products and equipment described in the Bid Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. All substitutions shall be in accordance with La. R.S. 38:2212(T)(2).

4.3.2 For closed specifications, when a potential supplier submits a particular product for prior approval other than a product specified in the Bid Documents, said product will not be considered unless written request for approval has been submitted by the Bidder and has been received by the Designer at least fourteen (14) working days prior to the opening of bids. (La. R.S. 38:2295(C)) Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution, including model numbers, drawings, cuts, performance and test data and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitution would require shall be included. It shall be the responsibility of the Bidder to include in his bid all changes required of the Bid Documents if the proposed product is used. Prior approval, if given, is contingent upon supplier being responsible for any costs which may be necessary to modify the space or facilities needed to accommodate the materials and equipment approved.

4.3.3 If the Designer approves any proposed substitution, such approval shall be set forth in an addendum. Bidders shall not rely upon approvals made in any other manner.

4.4 Addenda

4.4.1 Addenda will be transmitted to all who are known by the Designer to have requested and/or received a complete set of Bid Documents.

4.4.2 Copies of addenda will be made available for inspection wherever Bid Documents are on file for that purpose.

4.4.3 In accordance with La. R.S. 38:2212(O)(2)(b) addenda shall not be issued within a period of seventy-two (72) hours prior to the advertised time for the opening of bids, excluding Saturdays, Sundays, and any other legal holidays. If the necessity arises of issuing an addendum modifying plans and specifications within the seventy-two (72) hour period prior to the advertised time for the opening of bids, then the opening of bids shall be extended at least seven but no more than twenty-one (21) working days, without the requirement of re-advertising. **SOWELA Technical Community College Foundation** shall be consulted prior to issuance of such an addendum and shall approve such issuance. The revised time and date for the opening of bids shall be stated in the addendum.

4.4.4 Each Bidder shall ascertain from the Designer prior to submitting his bid that he has received all addenda issued, and he shall acknowledge their receipt on the Bid Form.

4.4.5 The Owner shall have the right to extend the bid date by up to (30) thirty days without the requirement of re-advertising. Any such extension shall be made by addendum issued by the Designer.

ARTICLE 5

BID PROCEDURE

5.1 Form and Style of Bids

5.1.1 Bids shall be submitted on the Louisiana Uniform Public Work Bid Form provided by the Designer for this project.

5.1.2 The Bidder shall ensure that all applicable blanks on the Bid Form are completely and accurately filled in.

5.1.3 Bid sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.

5.1.4 Any interlineation, alteration or erasure must be initialed by the signer of the bid or his authorized representative.

5.1.5 Bidders are cautioned to complete all alternates should such be required in the Bid Form. Failure to submit alternate prices will render the bid non responsive and shall cause its rejection.

5.1.6 Bidders are cautioned to complete all unit prices should such be required in the Bid Form. Unit prices represent a price proposal to do a specified quantity and quality of work. Unit prices are incorporated into the base bid or alternates, as indicated on the Unit Price Form, but are not the sole components thereof.

5.1.7 Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.

5.1.8 Written evidence of the authority of the person signing the bid for the public work shall be submitted in accordance with La. R.S. 38:2212(B)(5).

5.1.9 On any bid in excess of fifty thousand dollars ($50,000.00), the Bidder shall certify that he is licensed under La. R.S. 37: 2150-2173 and show his license number on the bid above his signature or his duly authorized representative.

5.2 Bid Security

5.2.1 No bid shall be considered or accepted unless the bid is accompanied by bid security in an amount of five percent (5.0%) of the base bid and all alternates.

The bid security shall be in the form of a certified check or cashier's check drawn on a bank insured by the Federal Deposit Insurance Corporation, or a Bid Bond written by a surety company licensed to do business in Louisiana and signed by the surety's agent or attorney-in-fact. The Bid Bond shall be written on the LCTCS Bid Bond Form provided in the Project Manual, and the surety for the bond must meet the qualifications stated thereon. The Bid Bond shall include the legal name of the Bidder, be in favor of the **SOWELA Technical Community College Foundation**, and shall be accompanied by appropriate power of attorney. The Bid Bond must be signed by both the Bidder/principal and the surety in the space provided on the LCTCS Bid Bond Form. Failure by the Bidder/principal or the surety to sign the Bid Bond shall result in the rejection of the bid.

Bid security furnished by the Bidder shall guarantee that the Bidder will, if awarded the work according to the terms of his proposal, enter into the Contract and furnish Performance and Payment Bonds as required by these Bid Documents, within fifteen (15) days after written notice that the instrument is ready for his signature.

Should the Bidder refuse to enter into such Contract or fail to furnish such bonds, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as penalty.

5.2.2 The Owner will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds have been furnished, or (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

5.3 Submission of Bids

5.3.1 The bid shall be sealed in an opaque envelope. The bid envelope shall be identified on the outside with the name of the project, and the name, address, and license number of the Bidder.
The envelope shall not contain multiple bid forms, and will be received until the time specified and at the place specified in the Advertisement for Bids. It shall be the specific responsibility of the Bidder to deliver his sealed bid to the **SOWELA Technical Community College Foundation** at the appointed place and prior to the announced time for the opening of bids. Late delivery of a bid for any reason, including late delivery by United States Mail, express delivery, or misdirection by any party, shall disqualify the bid.

If the bid is sent by mail in advance of the Bid Opening, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "Bid Enclosed" on the face thereof. Such bids shall be sent by Registered or Certified Mail, Return Receipt Requested, addressed to:

SOWELA Technical Community College
Foundation
3820 Senator J. Bennett Johnston Ave., Suite 109
Lake Charles, LA 70615
Attn.: Adam Reed, SOWELA Executive Director
of Facilities and Campus Operations

Bids sent by express delivery in advance of the Bid Opening shall be delivered to:

SOWELA Technical Community College
Foundation
3820 Senator J. Bennett Johnston Ave., Suite 109
Lake Charles, LA 70615
Attn.: Adam Reed, SOWELA Executive Director
of Facilities and Campus Operations

If the bid is hand delivered in advance of the Bid Opening, it shall be delivered to:

SOWELA Technical Community College
Foundation
3820 Senator J. Bennett Johnston Ave., Suite 109
Lake Charles, LA 70615
Attn.: Adam Reed, SOWELA Executive Director
of Facilities and Campus Operations

On the bid opening day, 15 minutes prior to the appointed time for the opening of bids, the bid may be delivered to:

SOWELA Technical Community College Foundation
SOWELA Regional Training Center
2nd Floor, Executive Conference Room 204
3749 Senator J. Bennett Johnston Ave.
Lake Charles, LA 70615

5.3.2 Bids shall be deposited at the designated location prior to the time on the date for receipt of bids indicated in the **Invitation To Bid**, or any extension thereof made by addendum. Bids received after the time and date for receipt of bids will be returned unopened.

5.3.3 Bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.

5.3.4 Oral, telephonic or telegraphic bids are invalid and shall not receive consideration. Owner shall not consider notations written on outside of bid envelope which have the effect of amending the bid. Written modifications enclosed in the bid envelope, and signed or initialed by the Contractor or his representative, shall be accepted.

5.4 Modification or Withdrawal of Bid

5.4.1 A bid may not be modified, withdrawn or canceled by the Bidder during the time stipulated in the Advertisement for Bids, for the period following the time and bid date designated for the receipt of bids, and Bidder so agrees in submitting his bid, except in accordance with La. R.S. 38:2214 which states, in part, "Bids containing patently obvious, unintentional, and substantial mechanical, clerical, or mathematical errors, or errors of unintentional omission of a substantial quantity of work, labor, material, or services made directly in the compilation of the bid, may be withdrawn by the contractor if clear and convincing sworn, written evidence of such errors is furnished to the public entity within forty-eight hours of the bid opening excluding Saturdays, Sundays, and legal holidays".

5.4.2 Prior to the time and date designated for receipt of bids, bids submitted early may be modified or withdrawn only by notice to the party receiving bids at the place and prior to the time designated for receipt of bids.

5.4.3 Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders.

5.4.4 Bid Security shall be in an amount sufficient for the bid as modified or resubmitted.

5.5 Prohibition of Discriminatory Boycotts of Israel

By submitting a bid, the Bidder certifies and agrees that the following information is correct:

In preparing its bid, the Bidder has considered all proposals submitted from qualified, potential subcontractors and suppliers, and has not, in the solicitation, selection, or commercial treatment of any subcontractor or supplier, refused to transact or terminated business activities, or taken other actions intended to limit commercial relations, with a person or entity that is engaging in commercial transactions in Israel or Israel-controlled territories, with the specific intent to accomplish a boycott or divestment of Israel. The Bidder has also not retaliated against any person or other entity for reporting such refusal, termination, or commercially limiting actions. The state reserves the right to reject any bid if this certification is subsequently determined to be false and to terminate any contract awarded based on such a false response.

ARTICLE 6

CONSIDERATION OF BIDS

6.1 Opening of Bids

6.1.1 The properly identified Bids received on time will be opened publicly and will be read aloud, and a tabulation abstract of the amounts of the base bids and alternates, if any, will be made available to Bidders after bid opening at by request to the Architect.

6.2 Rejection of Bids

6.2.1 The Owner shall have the right to reject any or all bids and in particular to reject a bid not accompanied by any required bid security or data required by the Bid Documents or a bid in any way incomplete or irregular.

6.3 Acceptance of Bid

6.3.1 It is the intent of the Owner, if he accepts any alternates, to accept them in the order in which they are listed in the Bid Form. Determination of the Low Bidder shall be on the basis of the sum of the base bid and the alternates accepted. However, the Owner shall reserve the right to accept alternates in any order which does not affect determination of the Low Bidder.

ARTICLE 7

POST-BID INFORMATION

7.1 Submissions

7.1.1 At the Pre-Construction Conference, the Contractor shall submit the following information to the Designer.

7.1.1.1 A designation of the work to be performed by the Contractor with his own forces.

7.1.1.2 A breakdown of the Contract cost attributable to each item listed in the Schedule of Values Form. No payments will be made to the Contractor until this is received.

7.1.1.3 The proprietary names and the suppliers of principal items or systems of material and equipment proposed for the work.

7.1.1.4 A list of names and business domiciles of all Subcontractors, manufacturers, suppliers or other persons or organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the work. It is the preference of the Owner that, to the greatest extent possible or practical, the Contractor utilize Louisiana Subcontractors, manufacturers, suppliers and labor.

7.1.2 The General Contractor shall be responsible for actions or inactions of Subcontractors and/or material suppliers.

The General Contractor is totally responsible for any lost time or extra expense incurred due to a Subcontractor's or Material Supplier's failure to perform. Failure to perform includes, but is not limited to, a Subcontractor's financial failure, abandonment of the project, failure to make prompt delivery, or failure to do work up to standard. Under no circumstances shall the Owner mitigate the General Contractor's losses or reimburse the General Contractor for losses caused by these events.

7.1.3 The lowest responsive and responsible Bidder shall submit to the Designer and the Owner within ten days after the bid opening a letter/letters from the manufacturer stating that the manufacturer will issue the roof system guarantee complying with the requirements of LCTCS based on the specified roof system and include the name of the applicator acceptable to the manufacturer at the highest level of certification for installing the specified roof system. This manufacturer shall be one that has received prior approval or is named in the specifications.

In accordance with La. R.S. 38:2227 [references La. R.S. 38:2212(A)(3)(c)(ii), which has since been renumbered as La. R.S. 38:2212(B)(3)(a)], La. R.S. 38:2212.10 and La. R.S. 23:1726(B) the apparent low Bidder on this project shall submit the completed Attestations Affidavit (Past Criminal Convictions of Bidders, Verification of Employees and Certification Regarding Unpaid Workers Compensation Insurance) form found within this bid package to FPC within 10 days after the opening of bids**.** The Attestations Affidavit may also be submitted in the bid envelope.

ARTICLE 8

PERFORMANCE AND PAYMENT BOND

8.1 Bond Required

8.1.1 The Contractor shall furnish and pay for a Performance and Payment Bond written by a company licensed to do business in Louisiana, which shall be signed by the surety's agent or attorney-in-fact, in an amount equal to 100% of the Contract amount. Surety must be listed currently on the U. S. Department of Treasury Financial Management Service List (Treasury List) as approved for an amount equal to or greater than the contract amount, or must be an insurance company domiciled in Louisiana or owned by Louisiana residents. If surety is qualified other than by listing on the Treasury list, the contract amount may not exceed fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance and may not exceed the amount of $500,000. However, a Louisiana domiciled insurance company with at least an A- rating in the latest printing of the A. M. Best's Key Rating Guide shall not be subject to the $500,000 limitation, provided that the contract amount does not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide nor fifteen percent of policyholders' surplus as shown by surety's most recent financial statements filed with the Louisiana Department of Insurance. The Bond shall be signed by the surety's agent or attorney-in-fact. The Bond shall be in favor of the **SOWELA Technical Community College Foundation.**

8.2 Time of Delivery and Form of Bond

8.2.1 The Contractor shall deliver the required bond to the Owner simultaneous with the execution of the Contract.

8.2.2 Bond shall be in the form furnished by LCTCS, Entitled Contract Between Owner And Contractor And Performance And Payment Bond, a copy of which is included in the Bid Documents.

8.2.3 The Contractor shall require the Attorney-in-Fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.

ARTICLE 9

FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 Form to be Used

9.1.1 Form of the Contract to be used shall be as furnished by LCTCS, an example of which is included in the Project Manual / Bid Documents.

9.2 Award

9.2.1 After award of the Contract and prior to Contract execution, the successful Bidder, if a corporation, shall have on file with the Louisiana Secretary of State, a Disclosure of Ownership Affidavit, in accordance with La. R.S. 12:1-1622, 12:205(C) and 12:304(A)(11).

9.2.2 In accordance with Louisiana Law, when the Contract is awarded, the successful Bidder shall, at the time of the signing of the Contract, execute the Non-Collusion Affidavit included in the Contract Documents

9.2.3 When this project is financed either partially or entirely with State Bonds, the award of this Contract is contingent upon the sale of bonds by the State Bond Commission. The State shall incur no obligation to the Contractor until the Contract Between Owner and Contractor is duly executed.

LIST OF REQUIRED DOCUMENTS

The following items are required to be submitted as part of the Contractor's Bid:

1. Louisiana Uniform Public Works Bid Form
2. Louisiana Uniform Public works Bid Form – Unit Price Form (if applicable).
3. Bid Bond Form, with Power of Attorney attached.
4. Evidence of Corporate Authority of the person signing the Bid, in accordance with LA. R.S. 38:2212(5).

The following items are required to be submitted by the Apparent Low Bidder to the Architect or Owner within 10 days of the Bid, and prior to award of the project:

Note: SOWELA Technical Community College Foundation will require 5 original, signed and/or notarized copies (as is applicable) of each item listed below be submitted.

1. Resolution
2. Non-Collusion Affidavit of Prime Bidder
3. Attestations Affidavit (R.S. 38:2224, 38:2190, and 23:2290-2296)
4. Attestations Affidavit (R.S. 38:2227, 38:2212.10, and 23:1726(B))
5. Subcontractor Approval List
6. Resume', and a list of successfully completed projects, along with project information and Owner references for the proposed Project Manager, for review and approval by the Owner and Architect.
7. Resume', and a list of successfully completed projects, along with project information and Owner references for the proposed Superintendent, for review and approval by the Owner and Architect.
8. Roofing Manufacturer's Certification and Compliance Letter, issued on the Roofing Manufacturer's Company Letterhead, and signed by an officer, or other duly appointed representative of the Roofing Manufacturer, stating the following:
   - That the proposed Roofing Installer is an Approved Applicator for the system(s) specified and/or prior approved, and is in current good standing with the company.
   - That the roofing system as specified, drawn, denoted, or as modified by Addendum, is acceptable to the Roofing Manufacturer, and meets the requirements for issuance of the specified 20-year, No-Dollar-Limit-Non-Pro-Rated Roof Weathertightness Warranty, in accordance with the Specifications.
   - That the Roofing Manufacturer will issue the required 20-year, No-Dollar-Limit-Non-Pro-Rated Roof Weathertightness Warranty, in accordance with the Specifications.
   - That the Roofing Manufacturer will provide the required on-site inspections, performed by the Roofing Manufacturer's full-time, Technical Field Representative, and will issue written reports along with photographic documentation accordingly, in accordance with the requirements of the applicable Specifications.

END OF SECTION

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: SOWELA Technical Community College Foundation
3820 Senator J. Bennett Johnston Ave.
Lake Charles, LA 70615

BID FOR: Process Technology Building Expansion for SOWELA Technical Community College
La. Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615
Louisiana State Project No.: T.B.D.

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 Champeaux Evans Hotard, APAC, and dated March 13, 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 as "Base Bid" (but not Alternates) for the lump 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.

Alternate No. 1 – Interior Renovation of (1) Existing Classroom to become a new Process Control Simulation Lab, as indicated in the Drawings, for the lump sum of:

_____Dollars ($ _____)

Alternate No. 2 - Interior Renovation of the existing Faculty Area, as indicated in the Drawings, for the lump sum of:

_____Dollars ($ _____)

Alternate No. 3 – Construction of a New Dumpster Yard and Drive, as indicated in the Drawings, 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
UNIT PRICE FORM

TO: **SOWELA Technical Community College Foundation**
3820 Senator J. Bennett Johnston Ave.
Lake Charles, LA 70615

BID FOR: **Process Technology Building Expansion**
for SOWELA Technical Community College
La. Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615
Louisiana State Project No.: T.B.D.

UNIT PRICES: **(ADD or DEDUCT) Furnish and Install Additional Excavation & Lime-Treated Structural Fill, Placed and Compacted, including all Materials, Labor, Equipment, Transportation, Profit, Bonds, Insurances, etc. Actual / final quantity shall be verified and documented in the field. Quantity of excavation and fill shall be measured and calculated based on In-Place / Open Hole measurements. Truck measurement(s) shall not be utilized.**

DESCRIPTION:	❑ Base Bid or ❑ Alt.# ___			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
1	**300**	**Cubic Yards**		

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.

BID BOND

FOR

SOWELA TECHNICAL COMMUNITY COLLEGE FOUNDATION
LOUISIANA COMMUNITY AND TECHNICAL COLLEGE SYSTEM
& LCTCS FACILITIES CORPORATION PROJECTS

KNOW ALL MEN BY THESE PRESENTS: Date: _____

That_____ of _____, as

Principal, and_____, as Surety, are held and firmly bound unto the **SOWELA Technical Community College Foundation** (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U. S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A - rating in the latest printing of the A. M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

Process Technology Building Expansion
for SOWELA Technical Community College
Louisiana Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615
Louisiana State Project No.: T.B.D.

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

_____	_____
PRINCIPAL (BIDDER)	SURETY
BY: _____	BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER	AGENT OR ATTORNEY-IN-FACT(SEAL)

STATE OF LOUISIANA
PARISH OF CALCASIEU

CONTRACT BETWEEN OWNER AND CONTRACTOR
AND PERFORMANCE AND PAYMENT BOND

This agreement entered into this _____ day of _____, 2026,

by **«Contractor»** hereinafter called the "Contractor", whose

business address is **«Contractor_Address», «Contractor_City», «Contractor_State» «Contractor_Zip»**, and the **SOWELA Technical Community College Foundation**, herein represented by the contracting officer executing this contract, hereinafter called the "Owner".

Witnesseth that the Contractor and the Owner, in consideration of premises and the mutual covenants; consideration and agreement herein contained, agree as follows:

Statement of Work: The contractor shall furnish all labor and materials and perform all of the work required to build, construct and complete in a thorough and workmanlike manner:

Process Technology Building Expansion
for SOWELA Technical Community College
Louisiana Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615
Louisiana State Project No.: T.B.D.

State ID No.: «StateID» Site Code: «SiteCode»

in strict accordance with Contract Documents prepared by:

Champeaux Evans Hotard, APAC
702 Dr. Michael Debakey Drive
Lake Charles, LA 70601

It is recognized by the parties herein that said Contract Documents including by way of example and not of limitation, the Drawings and Specifications dated **March 13, 2026**, Addenda number(s) **« Addenda_No. »**, the Instruction to Bidders, Bid Form, General Conditions, Supplementary Conditions, any Addenda thereto, impose duties and obligations upon the parties herein, and said parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full.

Time for Completion: The work shall be commenced on a date to be specified in a written order of the Owner and shall be completed within **«Time_Completion_Days» («Time_Completion_Days»)** consecutive calendar days from and after the said date.

Liquidated Damages: Contractor shall be assessed Liquidated Damages in the amount of **$1,000.00** per day for each consecutive calendar day which work is not complete beginning with the first day beyond the completion time.

Compensation to be paid to the Contractor: The Owner will pay and the Contractor will accept in full consideration for the performance of the contract the sum of: **«Contract_Amount_Words» and No/100 Dollars («Contract_Amount_Numerals»)** which sum represents the **«Base_Bid_+_Plus Alternates, as is applicable».**

Taxes: Contractor hereby agrees that the responsibility for payment of taxes from the funds thus received under this Contract and/or legislative appropriation shall be contractor's obligation and identified under Federal Tax Identification Number: _____.

PERFORMANCE AND PAYMENT BOND

To these presents personally came and intervened _____, herein acting for

_____, a corporation organized and existing under the

laws of the State of _____, and duly authorized to transact business in the State of Louisiana, as surety, who declared that having taken cognizance of this contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his said company, as Surety for the said Contractor, unto the said Owner, up to the sum of:

«Contract_Amount_Words» and No/100 Dollars («Contract_Amount_Numerals»).

By issuance of this bond, the surety acknowledges they are in compliance with R.S. 38:2219.

The condition of this Performance and Payment Bond shall be that should the Contractor herein not perform the Contract in accordance with the terms and conditions hereof, or should said Contractor not fully indemnify and save harmless the Owner, from all cost and damages which he may suffer by said Contractor's non-performance or should said Contractor not pay all persons who have and fulfill obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said Surety agrees and is bound to so perform the Contract and make said payment(s).

Provided, that any alterations which may be made in the terms of the contract or in the work to be done under it, or the giving by the Owner of any extensions of time for the performance of the Contract, or any other forbearance on the part of either the Owner or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

Contractor acknowledges and agrees to comply with the provisions of La. R.S. 38:2212.10 and federal law pertaining to E-Verify in the performance of services under this Contract.

It is hereby agreed that the Legislative Auditor of the State of Louisiana and/or the Office of the Governor, Division of Administration auditors shall have the option of auditing all accounts of Contractor which relate to this contract.

The continuation of this Contract is contingent upon the appropriation of funds to fulfill the requirements of the Contract by the legislature. If the legislature fails to appropriate sufficient monies to provide for the continuation of the Contract, or if such appropriation is reduced by the veto of the Governor or by any means provided in the appropriations act to prevent the total appropriation for the year from exceeding revenues for that year, or for any other lawful purpose, and the effect of such reduction is to provide insufficient monies for the continuation of the Contract, the Contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated.

The Contractor agrees to abide by the requirements of the following as applicable: Title VI of the Civil Rights Act of 1964 and Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972, Federal Executive Order 11246 as amended, the Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, the Fair Housing Act of 1968 as amended, and contractor agrees to abide by the requirements of the Americans with Disabilities Act of 1990.

Contractor agrees not to discriminate in its employment practices, and will render services under this Contract without regard to race, color, religion, sex, sexual orientation, national origin, veteran status, political affiliation, disability, or age in any matter relating to employment. Any act of discrimination committed by Contractor, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this Contract.

In accordance with R.S. 39:1602.1, effective May 22, 2018, for any Contract for $100,000 or more and for any Contractor with five or more employees, Contractor, or any Subcontractor, shall certify it is not engaging in a boycott of Israel, and shall, for the duration of this Contract, refrain from a boycott of Israel. The State reserves the right to terminate this Contract if the Contractor, or any Subcontractor, engages in a boycott of Israel during the term of the Contract.

In accordance with La. R.S. 39:1602.2, the following applies to any competitive sealed bids, competitive sealed proposals, or contract(s) with a value of $100,000 or more involving a for-profit company with at least fifty full-time employees:

Unless otherwise exempted by law, by submitting a response to this solicitation or entering into this contract, the Bidder, Proposer or Contractor certifies the following:

1. The company does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association based solely on the entity's or association's status as a firearm entity or firearm trade association;
2. The company will not discriminate against a firearm entity or firearm trade association during the term of the contract based solely on the entity's or association's status as a firearm entity or firearm trade association.

The State reserves the right to reject the response of the Bidder, Proposer or Contractor if this certification is subsequently determined to be false, and to terminate any Contract awarded based on such a false response or if the certification is no longer true.

Contractor has a continuing obligation to disclose any suspensions or debarment by any government entity, including but not limited to General Services Administration (GSA). Failure to disclosed may constitute grounds for suspension and/or termination of the Contract and debarment from future Contracts.

Contractor, and each tier of Subcontractors, shall certify that it is not on the List of Parties Excluded from Federal Procurement or Non-procurement Programs promulgated in accordance with E.O.s 12549 and 12689, "Debarment and Suspension," as set forth at 24 CFR part 24.

In Witness whereof, the parties hereto on the day and year first above written have executed this agreement in ___six (6)___ counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

THUS DONE AND SIGNED at Baton Rouge, Louisiana, on the day, month, and year first written above.

WITNESSES:

_____
LCTCS Facilities Corporation Witness #1

_____
LCTCS Facilities Corporation Witness #2

_____
Contractor Witness #1 Sign Here

_____
Contractor Witness #2 Sign Here

_____
Surety Witness #1 Sign Here

_____
Surety Witness #2 Sign Here

SOWELA TECHNICAL COMMUNITY COLLEGE FOUNDATION

BY: _____
RON RICHARD, PRESIDENT

BY: _____
«CONTRACTOR»

SURETY:

BY: _____
ATTORNEY IN FACT

_____

_____
ADDRESS

_____
TELEPHONE NUMBER

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

PROCESS TECHNOLOGY BUILDING EXPANSION
for SOWELA TECHNICAL COMMUNITY COLLEGE
Louisiana Community and Technical College System
3500 Senator J. Bennett Johnston Ave., Lake Charles, Louisiana, 70615
L.C.T.C.S. Project No.: T.B.D.

THE OWNER:
SOWELA Technical Community College Foundation
3820 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana 70615

THE ARCHITECT:
Champeaux Evans Hotard, APAC
702 Dr. Michael Debakey Drive, Lake Charles, Louisiana, 70601

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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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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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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§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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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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§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor 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 Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

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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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§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

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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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delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

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specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely 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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§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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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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ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity 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.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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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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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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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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§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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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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.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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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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§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents;
- **.3** terms of special warranties required by the Contract Documents; or
- **.4** audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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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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promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor 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 Contractor 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. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

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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.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

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The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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§ 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.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

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approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- **.3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- **.4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 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.

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§ 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;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, 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, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 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.

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§ 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.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 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.

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§ 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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SOWELA TECHNICAL COMMUNITY COLLEGE FOUNDATION
LOUISIANA COMMUNITY AND TECHNICAL COLLEGE SYSTEM
& LCTCS FACILITIES CORPORATION PROJECTS

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.

3.7.2 In Section 3.7.2, replace the word “public” with the word “State”.

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

Delete Sections 3.8.1, 3.8.2, and 3.8.3 in their entirety and add the following new Section 3.8.1:

3.8.1 Allowances shall not be made on any of the Work.

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 $_____.**		
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 <u>each</u> 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 Nineteenth Judicial Court in and for the Parish of East Baton Rouge, 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.

STATE OF LOUISIANA
PARISH OF **«PARISH OF CONTRACTOR»**

Process Technology Building Expansion
for SOWELA Technical Community College
La. Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615

SOWELA Technical Community College Foundation
Project No.: 2026-01
State ID No.: «StateID» Site Code: «SiteCode»

RESOLUTION

BE IT RESOLVED that _____ ,

Officer / Owner of _____ ,

is hereby authorized to sign any Contract or document on behalf of:

Company Name: _____

_____
Name of Officer/Owner

_____
Title of Officer/Owner

_____
Signature

SWORN TO AND SUBSCRIBED before me this_____day of_____,
20____, in Lake Charles, Louisiana.

_____
Notary Public

My Commission Expires _____

SUBMIT THIS FORM TO OWNER WITHIN TEN (10) DAYS AFTER BID OPENING

STATE OF LOUISIANA
PARISH OF **«PARISH OF CONTRACTOR»**

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for SOWELA Technical Community College
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SOWELA Technical Community College
Foundation Project No.: 2026-01
State ID No.: «StateID» Site Code: «SiteCode»

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

Before me, the undersigned authority, duly commissioned and qualified within and for the State and Parish aforesaid, personally came and appeared _____

representing **«Contractor»** .
who, being by me first duly sworn deposed and said that he has read this affidavit and does hereby agree under oath to comply with all provisions herein as follows:

PART I.

Section 2224 of Part II of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

(1) That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

(2) That no part of the Contract price received by affiant was paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the Contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction, alteration or demolition of the public building or project were in the regular course of their duties for affiant.

PART II.

Section 2190 of Part I of Chapter 10 of Title 38 of the Louisiana Revised Statutes, as amended.

That affiant, if an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm, partnership, or other organization which supplies materials for the construction of a public work when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public work for which the materials are being supplied.

For the purposes of this Section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

_____
AFFIANT

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 2026.

_____
NOTARY

STATE OF LOUISIANA
PARISH OF **«PARISH OF CONTRACTOR»**

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for SOWELA Technical Community College
La. Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615

SOWELA Technical Community College
Foundation Project No.: 2026-01
State ID No.: «StateID» Site Code: «SiteCode»

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. 38:2224

That affiant employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract under which he received payment, other than persons regularly employed by the affiant whose services in connection with the construction of the public building or project or in securing the public contract were in the regular course of their duties for affiant; and

That no part of the contract price received by affiant as paid or will be paid to any person, corporation, firm, association, or other organization for soliciting the contract, other than the payment of their normal compensation to persons regularly employed by the affiant whose services in connection with the construction of the public building or project were in the regular course of their duties for affiant.

LA. R.S. 38:2190

That affiant, if he be an architect or engineer, or representative thereof, does not own a substantial financial interest, either directly or indirectly, in any corporation, firm partnership, or other organization which supplies materials for the construction of a public building or project when the architect or engineer has performed architectural or engineering services, either directly or indirectly, in connection with the public building or project for which the materials are being supplied.

For the purpose of this section, a "substantial financial interest" shall exclude any interest in stock being traded on the American Stock Exchange or the New York Stock Exchange.

That affiant, if subject to the provisions of this section, does hereby agree to be subject to the penalties involved for the violation of this section.

STATE OF LOUISIANA
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AFFIDAVIT

LA. R.S. 38:2290 – 2296

That affiant does hereby state that he has read and agrees to comply with and be subject to the provisions of Part V of Chapter 10 of Title 38 of the Louisiana Revised Statutes of 1950, being Sections 2290 through 2296 of Title 38 as amended.

_____	_____
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

STATE OF LOUISIANA
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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, Appearer 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, Appearer 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, Appearer shall require all subcontractors to submit to it a sworn affidavit verifying compliance with Paragraphs (A) and (B) of this Subsection.

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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

SUBCONTRACTOR LIST

Process Technology Building Expansion
for SOWELA Technical Community College
La. Community and Technical College System
3500 Senator J. Bennett Johnston Ave.
Lake Charles, Louisiana, 70615

SOWELA Technical Community College Foundation
Project No.: 2026-01

WORK DESCRIPTION	SUBCONTRACTOR	LICENSE NUMBER	FED. I.D. NUMBER

Louisiana Community and Technical College System
LCTCS Facilities Corporation

15. PRE-CONSTRUCTION CONFERENCE AGENDA

As a minimum, the following items are to be covered in the pre-construction conference. The Designer may, at his discretion, add additional items which he feels are important to this particular project.

1. Contractor shall furnish the following prior to his first payment:

a. Cost breakdown (Schedule of Values), shall be in standard Construction Specifications Institute format.
b. List Sub-contractors and major suppliers
c. Information listed in Paragraph 7.1 of the Supplementary Conditions.
d. Construction Schedule as defined in 3.10.2 of General Conditions and Supplementary Conditions.
No payments to the contractor shall be made until this information is provided.

2. Roles of Individuals:

a. **Designer** – shall be solely responsible for the direction of the project. The Designer shall keep minutes of all meetings, including construction progress meetings, and distribute within 7 days. All instructions to contractor shall come from the designer. All decisions and directions shall be in writing. Verbal instructions shall be immediately confirmed in writing. The Designer and his principal consultants shall visit the project regularly according to the requirements of the Louisiana Capital Improvement Projects Procedure Manual for Design and Construction.
The Designer shall NOT assume the role of his principal consultants in site visits. Copies of Designer Site Visit Reports are to be sent to Louisiana Community and Technical College System / LCTCS Facilities Corporation and the User Agency on a weekly basis.
b. **Louisiana Community and Technical College System / LCTCS Facilities Corporation** - Designer to receive instructions only from Louisiana Community and Technical College System / LCTCS Facilities Corporation. Program or design changes shall be approved by Louisiana Community and Technical College System / LCTCS Facilities Corporation prior to any work being performed by the Designer.
c. **User Agency** - Address all requests for changes through Louisiana Community and Technical College System / LCTCS Facilities Corporation. Establish ground rules for the contractor and his personnel while working on their premises. If representatives of Facility Planning & Control or the using agency find any discrepancies, they believe to be contrary to the Contract Documents, they shall notify the designer. If it is thought that discrepancy needs immediate attention, the individual discovering the discrepancy and the contractor's representative should call the designer for immediate resolution.
d. **Contractor** - Work shall be according to the Contract Documents, not necessarily standard practice. Emergency action to protect life or property shall be taken immediately by the superintendent on the site. Less urgent action shall be resolved by telephone among the appropriate parties. Fire Marshal approved documents shall be accessible at all times at the project site, in accordance with Fire Marshal requirements. Approved documents from all other applicable regulatory agencies shall also be accessible at all times at the project site.

3. Change Orders:

All requests for a change in time and/or money shall be submitted to the designer, with proper back up data, for his review. The designer shall submit the Change Order to Louisiana Community and Technical College System / LCTCS Facilities Corporation with his recommendation of action required. The Change Order shall be approved by LCTCS prior to any additional work being performed.

a. Change Orders cannot be approved without the proper breakdown as required by the Supplementary Conditions, Section 7.2. The same requirements apply to time extension requests.
b. Louisiana Community and Technical College System / LCTCS Facilities Corporation needs only the original and one (1) copy of backup.
c. Change Orders should be rounded to the nearest whole dollar amount.
d. User paid change orders are **not** allowed.
e. User requested change orders are to be avoided.

4. Invoice Procedure:

a. Invoices may be submitted in electronic format.

1) Contractor shall submit one Certificate for Payment directly to the Designer. Louisiana Community and Technical College System / LCTCS Facilities Corporation – Application and Certification for Payment forms shall be used for submittal. Certificate for payment need **not** be notarized.
2) After review, the Designer shall process the Certificate as promptly as possible, in any case within seven (7) days. If a Certificate is held for any reason, written notice stating the reason for delay should be given the owner and the contractor. If a Certificate is changed for any reason, changes will be made to all copies.
3) Distribution of copies shall be as follows:
a) Designer forwards one Certificate for Payment directly to Louisiana Community and Technical College System / LCTCS Facilities Corporation with a transmittal letter/memo.
b) Designer forwards copy of transmittal letter and one (1) copy of Certificate to Contractor. One (1) copy retained for Designer records. One (1) copy sent to User Agency.

b. During construction, designer's invoices shall be sent directly to Facility Planning & Control.

c. If federal funds are involved, compliance with additional regulations is required including but not limited to:
Davis Bacon Act - Wage rate & payroll records.
Drug Free Workplace Act
Civil Rights EOP poster with name of EOP person shown.

d. Stored Materials must be on site for payment to be made. Payment will not be made for materials stored in a bonded warehouse or elsewhere.

e. An Original 45 Day Clear Lien and an Original Consent of Surety (AIA Form G707) is required prior to final payment to the contractor.

5. Prior Approval:

Only items as specified or prior approved in accordance with the Contract Documents will be incorporated into the project. Approval of shop drawings does not relieve Contractor of complying with the Prior Approval clause.

6. Testing Lab:

a. The Owner will engage and pay for the testing laboratory if required. If the Contractor obtains the services of a testing laboratory, he will be responsible for all costs for that laboratory
b. Designer should furnish Testing Lab with written notice of types and frequency of required tests. Set up procedure for Testing Lab notification.
c. No off site testing unless called for in the Contract Documents.
d. Louisiana Community and Technical College System / LCTCS Facilities Corporation will pay a minimum of standby time. Contractor may be billed if not well controlled.
e. Testing Lab invoices shall be submitted by hardcopy or in electronic format through the Designer, who in turn acknowledges their recognition of services submitted.

7. Project Sign

When a project sign is specified, select location.

8. Meetings:

Establish a time and place for the Monthly Meeting. Designer shall notify LCTCS prior to and provide minutes of all meetings to all participants within 7 days.

9. Roofing:

Pre-roofing Conference - establish a direct line of communication, iron out initial questions regarding the project and to review project submittal requirements. This conference should be held shortly after award of the roofing contract and a minimum of six (6) weeks prior to the anticipated start of roofing. Attendance by general contractor, roofing subcontractor and manufacturer's representative is required. A letter from the manufacturer stating the roofer is an approved applicator and sample warranties shall be submitted at the Pre-roofing Conference, if not before.

a. General Guidelines for Low Sloped Roofs
   1) Details in compliance with NRCA and Roof Manufacturer
   2) Concrete Decks are to be primed.
   3) Nailable Decks; Red Rosin sheet is required on wood decks.
   4) Fastening per manufacturer's requirements to comply with I-90 FM rating.
   5) Asphalt
      a) Type IV asphalt shall be used for all modified bitumen mop-down systems
      b) Temperature at the point of application shall be the EVT temperature plus or minus 25 degrees.
   6) Insulation
      a) All wet insulation is to be rejected and removed from the site.
      b) All insulation joints shall be staggered, including daily tie-ins.
   7) Metal
      a) Color Selection
      b) Gravel guard - use minimal raised lip for areas where drainage is over the edge.
      8) Drainage: Most guarantees prohibit water remaining on the roof more than 48 hours.
   9) Roofing guarantees
      a) No dollar limit. Guarantee system from the deck up, naming all products within the system.
      b) No language about "no pay, no guarantee".
      c) Warranty start date to be on or very near date of Acceptance of Building Contract. The roofing warranty required for his project must meet the requirements of LCTCS. It is important that the roofing manufacturer and applicator are aware of this. An incomplete or incorrect warranty **will** delay acceptance.
      d) Supplementary Conditions Section 13.3.3, the Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction in any action brought under this contract.
   10) Manufacturer's specification to be used in support of designer's specification. Manufacturer's requirements are a minimum, use designer's specification if it exceeds.
   11) Track weather days including predicted rain percentage. Submit to designer monthly with pay estimate.

Pre-application Conference to verify readiness of the project structure, review assignments of Preliminary Conference, scan last minute details, changes or corrections and to review the anticipated schedule of progress. This conference should be held within one (1) week of roofing application. Attendance by general contractor, roofing subcontractor and superintendent or foreman and manufacturer's representative is required.

Representatives of the designer and LCTCS shall be visiting the site to make sure the roof is being installed per the manufacturers' requirements and the Contract Documents. If found not in compliance, tests and corrective measures may be required to prove the roof is acceptable. Tests include Blow-Off Testing, etc.

Moisture Survey - When installation is complete, LCTCS will arrange to have a moisture survey performed. Deficiencies will be noted, either on the roof with paint or on roof plan drawing or both. After these deficiencies are corrected, this office will arrange to have these areas resurveyed. If these deficiencies are found not to be corrected and additional survey time is required, then the

cost of this time will be assessed against the contractor at a rate of $50.00 per hour through a credit change order.

Designer: Please fill out "Roof Completion Information" form and submit it with the Recommendation of Acceptance. If the roofed section is new, a scaled drawing is also needed. Preferably, this drawing would be on AutoCAD in compliance with the layers specified in our "Instructions to Designers."

10. General Correspondence:

a. Project Number must be on all correspondence.

b. Contractor shall copy Louisiana Community and Technical College System / LCTCS Facilities Corporation on any correspondence **if**:

1) It involves a controversial issue.

2) It relates to information requests to the Designer that had not been furnished in a timely manner.

11. Miscellaneous Items to be Discussed as Necessary:

a. Shop drawings, samples, hardware, and color schedules. Shop drawings submitted to the user by the designer are for record purposes only, not for approval. Approval is the sole responsibility of the designer.
COLOR SELECTION: If the User does not approve color selections in a timely manner, the Designer, in consultation with LCTCS, shall make the selections, which will be final.

b. Establish the location and type of temporary facilities and utilities. Establish how payment for temporary utilities will be made and how costs will be tracked?

c. Outages/Interruptions of Services. Contractor is to request, in writing, all outages/interruptions to the User. The amount of advance notice is to be determined by the user. Coordination of outages or interruptions is the responsibility of the contractor

d. Contractor use/access to pertinent buildings and facilities.

e. Location of staging area and/or fencing.

f. Site and stored material security is the contractor's responsibility.

g. Use of site, parking of vehicles, decals and/or permits for parking

h. The User shall have first refusal of salvaged materials. Where are they to be delivered? The contractor is responsible for the disposition of all other materials in accordance with laws and regulations.

i. Safety and First Aid. This is the contractor's responsibility.

j. Procedure for keeping Record Documents. Contractor to record as-built information that varies from the contract documents, on (1) one set of prints, to be furnished to the Designer at completion of the job. As-builts are prepared by Designer, inclusive of Supplemental Drawings, the Contractor, based on the as-built work and the required adjustments to the contract documents and the change orders, and shall be submitted timely to Louisiana Community and Technical College System / LCTCS Facilities Corporation**.** Plans shall be marked **"AS-BUILT"**. As-built drawings submitted to LCTCS shall consist of (2) two full size paper sets of Record Drawings (As-Built) prepared by the Designer. Also required are (2) two disks or flash drives of As-built drawings in AutoCAD (.dwg) and .pdf format, including electronic copies of the bid specifications and addenda. Acceptable As-builts are required prior to the Designer's final payment.

k. Use of any Asbestos Containing materials is prohibited.

l. Pictures or videos of existing conditions may be made.

m. Near the end of the project the LCTCS Project Manager will review the work to determine compliance with LCTCS's ADA Non-Comprehensive Field Checklist. Any accessibility problems identified in this review

shall be corrected before the project can be considered complete.

12. Pre-Close Out Conference

When the project reaches 75 to 80% completion the Designer will schedule a meeting with the Contractor, LCTCS and the User to review the requirements and procedures for the Final Inspection and Acceptance.

SCHEDULE OF VALUES

The Contractor is to use the following format. The total Contract Cost is to be itemized in each Subsection listed (as applicable)

DIVISION 01 – GENERAL REQUIREMENTS	Quantity	Cost
01 00 00 General Requirements		
01 32 50 Record Drawings, Shop Drawings, Product Data, Samples and other submittals.		
	TOTAL	
DIVISION 02 – EXISTING CONDITIONS		
02 30 00 Subsurface Investigation		
02 41 00 Demolition		
	TOTAL	
DIVISION 03 – CONCRETE		
03 01 00 Maintenance of Concrete		
03 11 00 Concrete Forming		
03 15 00 Concrete Accessories		
03 20 00 Concrete Reinforcing		
03 30 00 Cast-in-place Concrete		
03 40 00 Precast Concrete		
03 50 00 Cast Decks & Underlayment	TOTAL	
DIVISION 04 – MASONRY		
04 01 00 Maintenance of Masonry		
04 05 13 Masonry Mortaring		
04 05 19 Masonry Anchorage & Reinforcing		
04 05 23 Masonry Accessories		
04 20 00 Unit Masonry	TOTAL	
DIVISION 05 – METALS		
05 05 23 Metal Fastenings		
05 10 00 Structural Metal Framing		
05 20 00 Metal Joists		
05 30 00 Metal Decking		
05 50 00 Metal Fabrications		
05 58 00 Formed Metal Fabrications	TOTAL	
DIVISION 06 – WOOD, PLASTICS, & COMPOSITES		
06 05 23 Fastening and Adhesives		
06 10 00 Rough Carpentry		
06 13 00 Heavy Timber		
06 17 00 Shop-fabricated Structural Wood		
06 20 00 Finish Carpentry	SUB-TOTAL	

DISISION 06 – WOOD, PLASTICS, &
COMPOSITES (CONTINUES)

06 40 00	Architectural Woodwork		
06 60 00	Plastic Fabrications		
06 80 00	Composite Fabrications		
		TOTAL	

DIVISION 07 – THERMAL AND MOISTURE
PROTECTION

07 10 00	Dampproofing and Waterproofing		
07 18 00	Traffic Coatings		
07 19 00	Water Repellents		
07 21 00	Thermal Insulation		
07 24 00	Exterior Insulation & Finish Systems		
07 25 00	Weather Barriers		
07 31 00	Shingles and Shakes		
07 32 00	Roof Tiles		
07 40 00	Roofing and Siding Panels		
07 50 00	Membrane Roofing		
07 60 00	Flashing and Sheet Metal		
07 61 00	Sheet Metal Roofing		
07 70 00	Roof & Wall Specialties and Accessories		
07 80 00	Fire and Smoke Protection		
07 90 00	Joint Protection		
07 95 00	Expansion Control		
		TOTAL	

DIVISION 08 – OPENINGS

08 11 00	Metal Doors and Frames		
08 14 00	Wood Doors		
08 15 00	Plastic Doors		
08 30 00	Specialty Doors and Frames		
08 41 00	Entrances and Storefronts		
08 44 00	Curtain Wall and Glazed Assemblies		
08 51 00	Metal Windows		
08 52 00	Wood Windows		
08 53 00	Plastic Windows		
08 56 00	Special Function Windows		
08 60 00	Roof Windows and Skylights		
08 70 00	Hardware		
08 80 00	Glazing		
08 90 00	Louvers and Vents		
		TOTAL	

DIVISION 09 – FINISHES

09 22 00	Supports for Plaster and Gypsum Board		
09 23 00	Gypsum Plastering		
09 24 00	Portland Cement Plastering		
09 29 00	Gypsum Board		
09 30 00	Tiling		
		SUB-TOTAL	

DIVISION 09 – FINISHES (CONTINUED)

09 50 00	Acoustical Ceilings		
09 54 00	Specialty Ceilings		
	Quantity		
09 61 00	Flooring Treatment		
09 62 00	Specialty Flooring		
09 63 00	Masonry Flooring		
09 64 00	Wood Flooring		
09 65 00	Resilient Flooring		
09 66 00	Terrazzo Flooring		
09 68 00	Carpeting		
09 69 00	Access Flooring		
09 97 00	Wall Finishes		
09 91 00	Painting		
09 97 00	Special Coatings		
		TOTAL	

DIVISION 10 – SPECIALTIES

10 11 00	Visual Display Surfaces		
10 14 00	Signage		
10 21 00	Compartments and Cubicles		
10 22 00	Partitions		
10 26 00	Wall and Door Protection		
10 28 00	Toilet, Bath, and Laundry Accessories		
10 44 00	Fire Protection Specialties		
10 51 00	Lockers		
10 56 00	Storage Assemblies		
10 82 00	Grilles and Screens	TOTAL	

DIVISION 11 – EQUIPMENT

11 15 00	Security, Detention, and Banking Equipment		
11 19 00	Detention Equipment		
11 23 00	Commercial Laundry and		
	Dry Cleaning Equipment		
11 26 00	Unit Kitchens		
11 27 00	Photographic Processing Equipment		
11 40 00	Foodservice Equipment		
11 51 00	Library Equipment		
11 52 00	Audio-Visual Equipment		
11 53 00	Laboratory Equipment		
11 61 00	Theater and Stage Equipment		
11 65 00	Athletic and Recreational Equipment		
11 70 00	Healthcare Equipment		
		TOTAL	

DIVISION 12 – FURNISHINGS

12 20 00	Window Treatments		
12 30 00	Casework		
12 40 00	Furnishings and Accessories		
12 50 00	Furniture		
		TOTAL	

DIVISION 13 –SPECIAL CONSTRUCTION

13 10 00	Special Facility Components		
13 34 00	Fabricated Engineered Structures		
13 49 00	Radiation Protection		
		TOTAL	

DIVISION 14 – CONVEYING EQUIPMENT

14 20 00	Elevators		
14 30 00	Escalators and Moving Walks		
14 40 00	Lifts		
14 80 00	Scaffolding		
		TOTAL	

DIVISION 21 – FIRE SUPPRESSION

21 10 00	Water-Based Fire-Suppression Systems Piping		
21 20 00	Fire-Extinguishing Systems		
21 30 00	Fire Pumps		
		TOTAL	

DIVISION 22 – PLUMBING

22 07 00	Plumbing Insulation		
22 11 00	Facility Water Distribution		
22 13 00	Facility Sanitary Sewerage		
22 14 00	Facility Storm Drainage		
22 30 00	Plumbing Equipment		
22 40 00	Plumbing Fixtures		
		TOTAL	

DIVISION 23 – HEATING, VENTILATING, & AIR-CONDITIONING

23 05 93	Testing, Adjusting, & Balancing for HVAC		
23 07 00	HVAC Insulation		
23 09 00	Instrumentation & Control for HVAC		
23 13 00	Facility Fuel-Storage Tanks		
23 20 00	HVAC Piping and Pumps		
23 30 00	HVAC Air Distribution		
23 40 00	HVAC Air Cleaning Devices		
23 50 00	Central Heating Equipment		
23 60 00	Central Cooling Equipment		
23 70 00	Central HVAC Equipment		
		TOTAL	

DIVISION 26 – ELECTRICAL

26 09 00	Instrumentation & Control for Electrical Systems		
26 10 00	Medium-Voltage Electrical Distribution		
26 20 00	Low-Voltage Electrical Transmission		
26 27 00	Low-Voltage Distribution Equipment		
26 30 00	Facility Electrical Power Generating & Storage Equipment		
26 40 00	Electrical and Cathodic Protection		
26 50 00	Lighting		
		TOTAL	

DIVIASION 27 – COMMUNICATIONS

27 10 00	Structured Cabling		
27 20 00	Data Communications		
27 30 00	Voice Communications		
27 40 00	Audio-Video Communications		
27 50 00	Distributed Communications & Monitoring Systems		
		TOTAL	

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 10 00	Electronic Access Control & Intrusion Detection		
28 20 00	Electronic Surveillance		
28 30 00	Electronic Detection and Alarm		
28 40 00	Electronic Monitoring and Control		
		TOTAL	

DIVISION 31 – EARTHWORK

31 10 00	Site Clearing		
31 20 00	Earth Moving		
31 31 00	Soil Treatment		
31 32 00	Soil Stabilization		
31 40 00	Shoring and Underpinning		
31 50 00	Excavation Support and Protection		
31 60 00	Special Foundations and Load-Bearing Elements		
		TOTAL	

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 10 00	Bases, Ballasts, and Paving		
32 30 00	Site Improvements		
32 90 00	Planting		
		TOTAL	

DIVISION 33 – UTILITIES

33 10 00	Water Utilities		
33 30 00	Sanitary Sewerage Utilities		
33 40 00	Storm Drainage Utilities		
33 50 00	Fuel Distribution Utilities		
33 60 00	Hydronic & Steam Energy Utilities		
33 70 00	Electrical Utilities		
33 80 00	Communications Utilities		
		TOTAL	

DIVISION 34 – TRANSPORTATION

34 00 00	Transportation		
		TOTAL	

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTIONS

35 00 00	Waterway and Marine construction		
		TOTAL	

DIVISION 40-43 – PROCESS EQUIPMENT

DIVISION 44 – POLLUTION CONTROL EQUIPMENT

44 40 00	Water Treatment Equipment	_____	_____
44 41 00	Packaged Water Treatment Plants	_____	_____
44 50 00	Solid Waste Control	_____	_____
		TOTAL	_____

DIVISION 45 – INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT

DIVISION 48 – ELECTRICAL POWER GENERATION

48 10 00	Electrical Power Generation Equipment	_____	_____
48 70 00	Electrical Power Generation Testing	_____	_____
		TOTAL	_____

AIA® Document G702® – 1992

Application and Certificate for Payment

TO OWNER:

PROJECT:

APPLICATION NO: 000
PERIOD TO:
CONTRACT FOR: General Construction
CONTRACT DATE:
PROJECT NOS: Champeaux Evans Hotard, APAC / / Jefferson Davis Parish School Board

Distribution to:
OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703®, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM		$0.00
2. NET CHANGE BY CHANGE ORDERS		$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$0.00	
b. 0 % of Stored Material (Column F on G703)	$0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$0.00
8. CURRENT PAYMENT DUE		$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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User Notes:
(3B9ADA61)

AIA® Document G703® – 1992

Continuation Sheet

AIA Document G702®, Application and Certification for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:	002
APPLICATION DATE:	
PERIOD TO:	
ARCHITECT'S PROJECT NO:	Champeaux Evans Hotard, APAC

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**0.00%**	**$0.00**	**$0.00**

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User Notes:
(3B9ADA63)

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System

CHANGE ORDER

PROJECT NAME: _____ CHANGE ORDER No. _____
PROJECT & WBS No: _____ CONTRACT DATE: _____
CONTRACTOR: _____ NTP DATE: _____
SITE CODE: _____ STATE ID: _____ SRM No.: _____

You are directed to make the following change(s) in this contract. Attach SUMMARY, BREAKDOWN and/or UNIT PRICE BREAKDOWN forms as required and give a brief description of each change below, including RFI No., cost and days from Summary

The Original Contract Sum		
Total Changes by Previous Change Order(s)		
Current Contract Sum		
Contract Sum will be ☐ unchanged ☐ increased by ☐ decreased by:		
New Contract Sum		
The Original Contract Completion Date and Contract Time. Date: _____		DAYS
Total Time extended by Previous Change Order(s)		DAYS
Contract Time will be ☐ unchanged ☐ increased by ☐ decreased by:		DAYS
New Contract Completion Date & Contract Time Date: _____		DAYS
Added Building Area		(Sq. Ft.)

NOTE ***: No additional increase in time or money will be considered for a Change Order item after it has been executed.***

RECOMMENDED	**ACCEPTED**	**APPROVED**
Designer's Name:	Contractor's Name:	Project Manager:
Address:	Address:	SOWELA Technical Community College Foundation
Email Address:	Email Address:	
By:	By:	By:
Date:	Date:	Date:

SOWELA TECHNICAL COMMUNITY COLLEGE FOUNDATION / LCTCS USE ONLY

Classification	**Amount**	**Classification**	**Amount**
Omission (Type "O")*		**Miscellaneous (Type "M")**	
Error (Type "E")*		**Owner Requested (Type "R")**	
COMMENTS:		Senior Manager/Assistant Director approval:	

Construction Contract Change Order

SUMMARY

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System
Project & WBS No. _____

Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor Name:
Description of Work:

General Contractor Direct Costs - Breakdown No. _____ _____
(See attached breakdown)

Total General Contractor Cost _____ % _____
(General Contract Direct Cost plus OH&P) (Max: 8%)

Subcontractor Cost Breakdowns
(See attached.)

Subcontractor Name	Breakdown No.	A Total Direct Cost	B OH&P (Max 8%)	C Total A+(A X B)
			%	
			%	
			%	
			%	
			%	
			%	
			%	
			%	

Subcontractor Direct Costs Total _____
(Sum column A)

Subcontractor Direct Costs + Subcontractor OH&P _____
(Sum column C)

General Contractor OH&P on Subcontractor Direct Cost at _____ % _____
(Sum column A times General Contractor OH&P rate.) (Max: 8%)

Total Subcontractor Costs _____
(Subcontractor Direct Costs + OH&P + General Contractor OH&P)

Change Order Subtotal _____
(Sum of Total General Contractor Costs and Total Subcontractor Costs)

Performance and Payment Bond at _____ %
(Change Order Subtotal times Performance and Payment Bond rate)

Amount will be ☐ increased by ☐ decreased by ☐ unchanged _____
(Sum of Change Order Subtotal and Performance and Payment Bond)

Days will be ☐ increased by ☐ decreased by ☐ unchanged _____
(Attach supporting data such as meteorological reports)

Construction Contract Change Order

BREAKDOWN

Breakdown No. _____

Item No. _____

RFI No. (or COR, CPR, etc.) _____

Date: _____

SOWELA Technical Community College Foundation
Louisiana Technical Community College System
Project & WBS No. _____

Project Name: _____

Contractor/Subcontractor Name: _____

Direct Cost of Work :

A. Labor	Check here if explained on the Comment Sheet ➧	Hourly Wage Rate	Hours	Total Cost
1 _____	☐			
2 _____	☐			
3 _____	☐			
4 _____	☐			
5 _____	☐			
6 _____	☐			
7 _____	☐			
			Sub Total	
			Add Labor Burden @ _____ %	
			LABOR TOTAL	

B. Material		Unit Price	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)				*Sub Total*	
				Add Tax @ _____ %	
				MATERIAL TOTAL	

C. Equipment		Unit Rate	Unit	Units	Total Cost
1 _____	☐				
2 _____	☐				
3 _____	☐				
4 _____	☐				
5 _____	☐				
6 _____	☐				
7 _____	☐				
(Copies of invoices may be required.)				*Sub Total*	
				Add Tax @ _____ %	
				EQUIPMENT TOTAL	

TOTAL DIRECT COST FOR THIS BREAKDOWN:
(Sum A, B & C)

Construction Contract Change Order

BREAKDOWN COMMENT SHEET

Breakdown No. _____

SOWELA Technical Community College Foundation — Item No. _____

Louisiana Community and Technical College System — RFI No. (or COR, CPR, etc.) _____

Project & WBS No. _____ — Date: _____

Project Name: _____

Contractor/Subcontractor: _____

A. Labor

No. (From BREAKDOWN Sheet)

B. Material

C. Equipment

Construction Contract Change Order

UNIT PRICE BREAKDOWN

Breakdown No. _____

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System
Project & WBS No. _____

Item No. _____
RFI No. (or COR, CPR, etc.) _____
Date: _____

Project Name: _____

Contractor/Subcontractor: _____

Unit Price Tabulation

(Unit prices must be included in the bid or clearly defined in a standard, industry recognized pricing reference. The pricing reference shall be identified herein.)

Unit Price Description	Reference*	Unit Price	Units	Total

* Reference Legend: _____

Unit Price Total:
(Sum Total column)

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System

Instructions for Change Order Back Up Forms

The General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition, and the Supplementary Conditions provide for changes in the contract in the form of change orders. The costs of such changes must be carefully, clearly and accurately documented. Louisiana Community and Technical College System / LCTCS Facilities Corporation has prepared a set of forms to be used to provide this documentation in a consistent format that is in accordance with the Contract Documents.
Change orders will typically contain one or more items of work. Each item of work will typically include work by the general contractor and/or one or more subcontractors. The documentation begins with a breakdown of the work of the contractor and each subcontractor. This is prepared using the form entitled "BREAKDOWN." One form for the General Contractor and one for each subcontractor. Each breakdown will be summarized on the form entitled "SUMMARY." Each item of work will, in turn, be summarized on the change order itself. This should be on the face of the change order.

The forms are available as a Microsoft Excel worksheet for ease of preparation, with formulas established for mark-ups and other basic mathematical operations.
These forms are to be used as provided. Any alteration to the forms may cause the change order to be rejected.

GENERAL:

(Refer to Article 7 of the Supplementary and General Conditions)

Forms - There are five forms to be used for all Louisiana Community and Technical College System / LCTCS Facilities Corporation change orders: CHANGE ORDER form, SUMMARY, BREAKDOWN, BREAKDOWN COMMENT SHEET and UNIT PRICE BREAKDOWN. The CHANGE ORDER form is the highest level and is the official, signed document. A CHANGE ORDER form may include one or more items of work, each of which is backed up by a SUMMARY. Each SUMMARY will be backed up with one or more BREAKDOWNs. Any unusual rates, unit costs or quantities may be explained on the COMMENT SHEET. It's simple. The BREAKDOWN form must be used for the general contractor and any subcontractor, at any level, that is to get OH&P. Use as many as needed.

Unit Pricing - Labor, material and equipment breakdown is the standard method of pricing change orders for Facility Planning and Control. However, unit pricing may be considered in some circumstances if the unit prices are clearly established such as by unit prices that were included in the bid. These prices may also be derived from a construction industry standard reference such as R.S. Means. If unit prices were included in the bid they are acceptable for pricing change order work and, in fact, must be used for any work that is included in the change order for which they were established . The UNIT PRICE BREAKDOWN is provided for this purpose.

CHANGE ORDER:

Project identification information: Complete as required. The Site Code, State ID and SRM No(s). (contract numbers) can be obtained from the Louisiana Community and Technical College System / LCTCS Facilities Corporation Project Manager.

Description: This will include a list of each attached SUMMARY that makes up this change order and a brief statement of the work included in each, including RFI No., cost and days from the SUMMARY page.

New Contract Sum: Calculate the new contract amount using the original contract amount, previous change orders and the new change order. Indicate the appropriate word for increase, decrease or unchanged by selecting the appropriate checkbox.

New Contract Completion Date and Revised Time: Calculate the new contract time using the original Contract Completion Date and Contract Time, previous changes in time and the change in time by this change order. Indicate the appropriate word for increase, decrease or unchanged by selecting the appropriate checkbox. Show days in the main column and the date in the blank indicated.

Added Building Area: Show any building area added by this change order. If none, enter "None."

RECOMMENDED: Show the Designer's name and address, sign on the line indicated as "By:" and date on the indicated line.

ACCEPTED: Show the Contractor's name and address, sign on the line indicated as "By:" and date on the indicated line.

APPROVED: For approval by Louisiana Community and Technical College System / LCTCS Facilities Corporation

SUMMARY:

(Refer to Article 7 of the Supplementary and General Conditions)

Item No.: Show the Item number as it will appear on the CHANGE ORDER Form. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., WBS No., Date, Project Name. Will auto-fill from information entered on the first tab.

Contractor: Name of General Contractor. Will auto-fill from information entered on the first tab.

Description of Work: Give a brief description of the work included in this **Item**.

General Contractor Direct Costs: Show the total General Contractor Cost from the BREAKDOWN and show the Breakdown No. in the space provided.

General Contractor Total Cost: Show the total General Contractor Cost plus the General Contractor's overhead and profit. The overhead and profit shall not exceed 8% of the Direct Cost.

Subcontractor Cost Breakdowns: List each subcontractor, Breakdown No. and Total Direct Cost (in column "A") from the attached BREAKDOWN sheets. Show the subcontractor's overhead and profit percentage in column "B" and show the calculated total of the direct cost plus the percentage of the direct cost in column "C." If the electronic version of the form is being used, column "C" will be automatically calculated. The overhead and profit shall not exceed 8% of the Total Direct Cost.

Subcontractor Direct Costs Total: Sum of column "A." This will be used to calculate the General Contractor's overhead and profit on the subcontractors' work. If the electronic version is being used, this will be an automatic calculation.

Subcontractor Direct Costs + Subcontractor OH&P: Sum of column "C." This represents the total amount that subcontractors will be paid. Automatic calculation.

General Contractor OH&P on Subcontractor Direct Cost at ___%. The contractors overhead and profit on the subcontractors' direct cost (without subcontractor OH&P.) Enter the percentage of the contractor's OH&P on the subcontractors' work (not to exceed 8%) and show the calculated total of the subcontractors' direct cost plus the percentage of the direct cost in the space. Automatic calculation.

Total Subcontractor Costs: Total of the last two spaces.

Change Order Subtotal: Total of change order except bond.

Performance and Payment Bond at ____%: Enter bond percentage (from amount provided by the contractor at the Pre-Construction Conference) and calculate the amount for the bond.

Amount will be (increased) (decreased) (unchanged) by: Add bond and calculate total change order amount. Indicate "increase," "decrease" or "unchanged" by checking the appropriate box.

Days will be (increased) (decreased) (unchanged) by: Show the number of days to be added or deleted from the contract, if any, due to changes in scope, adverse weather, unusual delays or other factors, **only** if it is proven the critical path is affected. Note that a change in scope does not necessarily indicate a change in time. Indicate "increased," "decreased" or "unchanged" by checking the appropriate box.

BREAKDOWN:

Item No. Show the Item number as it will appear on the CHANGE ORDER Form and the SUMMARY. Note: This may be one of several items included in one CHANGE ORDER form.

RFI No.: Show the number of the request for information. This may be known by another name such as COR (Change Order Request,) CPR (Change Proposal Request,) etc.

Project No., WBS No., Date, Project Name. Will auto-fill from information entered on the first tab.

Contractor: Name of General Contractor or Subcontractor, edit auto-fill as needed.

Direct Cost of Work:

Check here if explained on the Comment Sheet: If rates, unit costs or quantities may appear unreasonable compared to standard costs or quantities the reasons may be explained on the attached comment sheet and the box checked to indicate that there is an explanation.

A. Labor: Include the "wages paid" hourly direct labor and/or foreman necessary to perform the required change. "Wages paid" is the amount actually paid the employee, not the fully burdened charge rate used in the bid, etc. Supervisory personnel in district or home office shall not be included. Do not include the project superintendent, except as permitted by Section 7.2 of Supplementary Conditions. Supervisory personnel on the job-site, but with broad supervisory responsibility shall not be included as Direct Labor, except as permitted by Section 7.2 of Supplementary Conditions. Typically there will be only one superintendent on the job and his/her time shall not be included, except as permitted by Section 7.2 of Supplementary Conditions. Typically all other employees are eligible for inclusion. List by job title each person employed on the work, his/her hourly rate, the number hours work and the extended Total Cost. Do not list crews unless the rates for them are readily available in standard cost estimating references such as R. S. Means. Add the labor burden that was provided at the Pre-Construction conference and in compliance with the Contract Documents, and total the amounts in LABOR TOTAL.

B. Material: Include the acquisition cost of all materials directly required to perform the required change. List each material used in the work, the price per unit, name of the unit, the number of units used and the extended Total Cost. Add the tax rate and tax and total the amounts in MATERIAL TOTAL.

C. Equipment: Include the rental cost of equipment items necessary to perform the change. For company-owned equipment items, include documentation of internal rental rates submitted at the pre-construction conference. Charges for small tools, and craft specific tools are not allowed. List each piece of equipment used in the work, the rate by units of time (hour, day, week, etc.,) number of units of time the piece was in service on the work and the extended total cost. Add the tax rate, calculate the tax and total the amounts in EQUIPMENT TOTAL.

TOTAL DIRECT COST FOR THIS BREAKDOWN: Total of A. Labor, B. Material and C. Equipment. This is the amount that will be carried forward to the SUMMARY Sheet. This amount does **NOT** include Overhead and Profit. This will be added on the SUMMARY Sheet.

COMMENTS SHEET:

The COMMENTS SHEET uses the same heading as the SUMMARY and BREAKDOWN.

The COMMENTS SHEET includes three sections, one each for A. Labor, B. Materials and C. Equipment. These correspond to the sections in the BREAKDOWN. Each comment should be entered in the section to which it corresponds on the BREAKDOWN and numbered to correspond to the appropriate line. Comments are to used only to explain unusual rates, costs or quantities.

UNIT PRICE BREAKDOWN:

The UNIT PRICE BREAKDOWN uses the same heading as the BREAKDOWN.

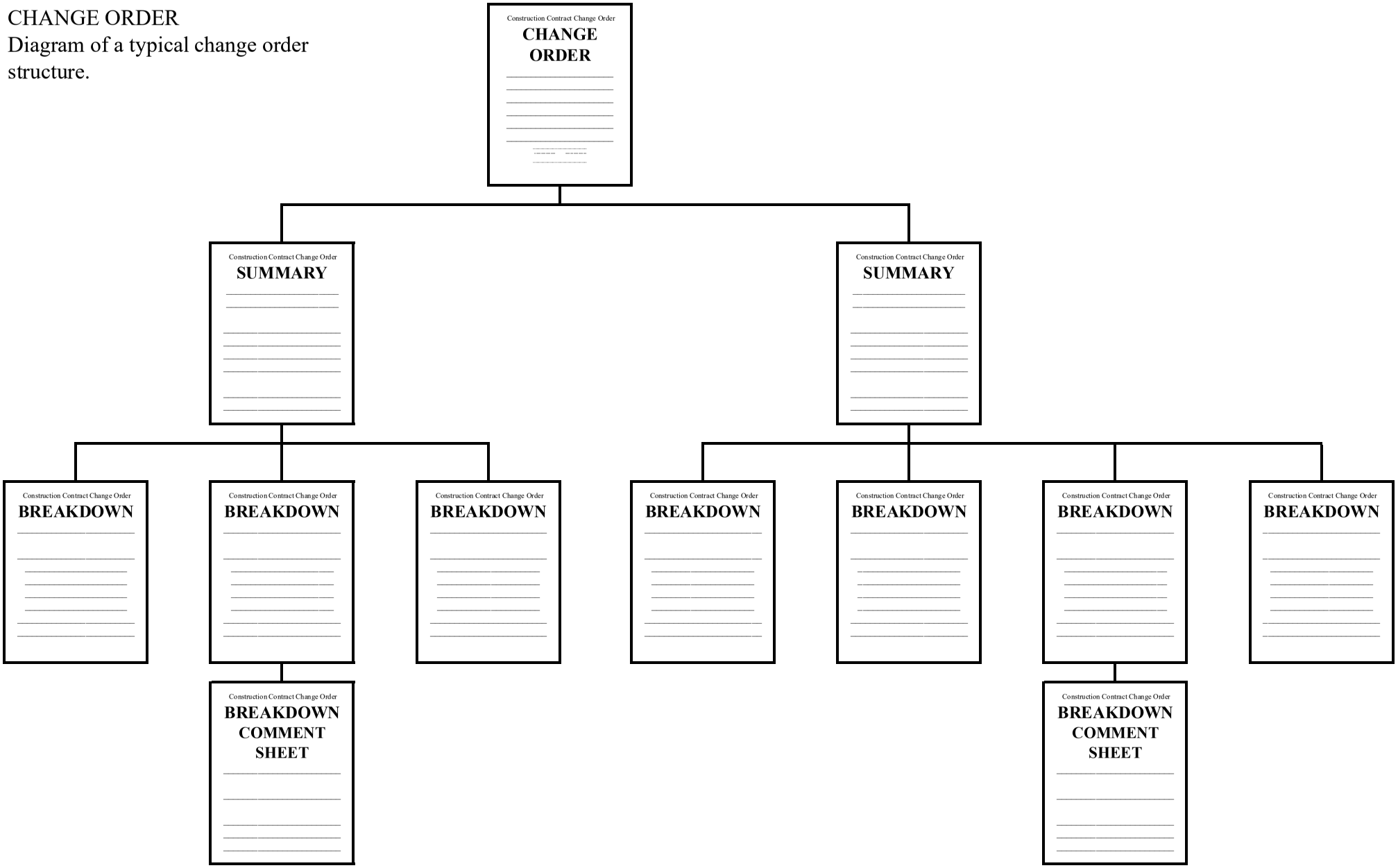
The UNIT PRICE BREAKDOWN is similar to the BREAKDOWN.

Unit Price Tabulation: Each unit price is listed along with its corresponding price and the number of units used in the work. The price and number of units are multiplied to provide the total cost of each unit price item. The pricing reference, such as the bid form for the project or a construction industry standard reference, must be cited for each unit price. This may be more fully described in "Reference Legend,"

Unit Price Total: Sum the unit prices to obtain the total cost for unit prices.

CHANGE ORDER

Diagram of a typical change order structure.



❖ **NOT FOR RECORDATION PURPOSES** ❖

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System

PARTIAL OCCUPANCY

PROJECT NAME:

PROJECT LOCATION:

PROJECT / PART NUMBER: CFMS / SRM No.

WBS NUMBER:

CONTRACTOR:

USER AGENCY:

The below described portion of subject project is, to the best of my knowledge and belief, complete to a point where the User desires to use in according with the Contract Documents.

DATE OCCUPIED: _____ .

WARRANTY items covered by Occupancy:

_____
Designer Date

_____
Contractor Date

_____
SOWELA Technical Community College Foundation Date

Punch List: Attached ❑

None ❑

c:

❖ **NOT FOR RECORDATION PURPOSES** ❖

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System

RECOMMENDATION OF ACCEPTANCE

TO: SOWELA Technical Community College Foundation
3820 Senator J. Bennett Johnston Ave.
Lake Charles, LA 70615

FROM: Champeaux Evans Hotard, APAC
702 Dr. Michael Debakey Drive
Lake Charles, Louisiana, 70601

DATE: _____

PROJECT NAME: _____

PROJECT & WBS NUMBER: _____

SITE CODE: _____ STATE ID: _____ SRM #: _____

CONTRACTOR: _____

_____

_____

ORIGINAL CONTRACT AMOUNT: $ _____

FINAL CONTRACT AMOUNT: $ _____

FINAL BUILDING AREA (SQ. FEET): _____

I certify that, to the best of my knowledge and belief, this project is substantially complete in accordance with the Plans and Specifications to the point where it can be used for the purpose which was intended. It is recommended that it be accepted.

DATE OF ACCEPTANCE: _____

CONTRACT DATE OF COMPLETION: _____

NUMBER OF DAYS (OVERRUN) (UNDERRUN) (As of Acceptance Date) _____

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT $ _____

VALUE OF PUNCH LIST $ _____

Was part of project occupied prior to Acceptance? ☐ No ☐Yes, see attached Partial Occupancy Forms

ADA Certificate of Compliance Required? ☐ No ☐Yes, see attached form.

La. Building Code Certificate of Compliance Required? ☐ No ☐Yes, see attached form.

ROOF GUAR-MANUF: _____ START DATE: _____ END DATE: _____

ROOFER: _____ START DATE: _____ END DATE: _____

Signed: _____
William B. Evans, Architect
Champeaux Evans Hotard, APAC

Signed: _____
Ron Richard, President
SOWELA Technical Community College Foundation

c: User Agency

SOWELA Technical Community College Foundation
Louisiana Community and Technical College System

LIQUIDATED DAMAGES ASSESSMENT

TO: SOWELA Technical Community College Foundation
3820 Senator J. Bennett Johnston Ave.
Lake Charles, LA 70615

FROM: _____
_____
_____
Design Firm Name and Address

DATE: _____

PROJECT NAME: _____

PROJECT NUMBER: _____ WBS No: _____

SITE CODE: _____ STATE ID: _____ CFMS: _____

CONTRACTOR: _____

_____

ORIGINAL CONTRACT AMOUNT: $ _____

FINAL CONTRACT AMOUNT: $ _____

DATE OF ACCEPTANCE:_____

CONTRACT DATE OF COMPLETION:_____

NUMBER OF DAYS OVERRUN (As of Acceptance Date) _____

LIQUIDATED DAMAGES PER DAY STIPULATED IN CONTRACT $_____

LIQUIDATED DAMAGES ASSESSMENT $_____

Signed:_____
William B. Evans, Architect
Champeaux Evans Hotard, APAC

Signed:_____
Ron Richard, President
SOWELA Technical Community College Foundation

c: User Agency

SOWELA Technical Community College Foundation
Louisiana Technical and Community College Sytem

LIQUIDATED DAMAGES ASSESSMENT

(Procedure of How SOWELA Technical Community College Foundation / LCTCS Calculates Liquidated Damages at Acceptance)

- If Acceptance Date = Completion Date, then 0 days are assessed (mathematically If AD = CD, then LD = 0)
- If Acceptance Date is 1 day after Completion date, then 1 day is assessed (don't count acceptance date, mathematically If AD – CD = 1, then LD = 1)
- If Acceptance Date is 2 days after Completion date, then 1 day is assessed (don't count acceptance date or completion date, mathematically If AD – CD > 1, then LD = AD – CD – 1)
- If Acceptance date is 3 days after Completion date, then 2 days are assessed (same as line above)
- If Acceptance date is 4 days after Completion date, then 3 days are assessed... etc.

R-1 ROOFING GUARANTEE
(Roofing Contractor is Sub to G.C.)

OWNER: Louisiana Community and Technical College System
LCTCS Facilities Corporation

ADDRESS: 265 South Foster Drive
Baton Rouge, Louisiana 70806

Whereas _____

Address _____

Telephone (_____)_____ Email _____

herein called the "Roofing Contractor", has performed roofing and flashing in accordance with the Contract Documents for Project No. & WBS _____
(hereinafter called the "Work") under a

Subcontract with _____

General Contractor on the Following Project: _____

Name of Project: _____

User Agency: _____

Location/Address: _____

Name and Type of Building(s): _____ State I.D. _____

Type(s) of Roof Deck(s): _____

Total Roof Area: _____ SF; Metal Edge Flashing: _____ LF

Date of Acceptance: _____Guarantee Period: 2 Years

Date of Expiration: _____

AND WHEREAS the Roofing Contractor has contracted (as a Subcontractor) to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period of TWO **(2) YEARS from the Acceptance Date** of the Project;

AND WHEREAS the General Contractor, by its acceptance of the Contract for the above described project, has jointly assumed with the Roofing Contractor the obligations to the Owner of said guarantee against leaks and faulty or defective materials and workmanship;

NOW THEREFORE the Roofing Contractor and the General Contractor jointly and severally guarantee, subject to the terms and conditions herein set forth, that during the Guarantee Period they will at their own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements

of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner/User Agency. Furthermore, they will at their own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner and User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Damage to the roof caused by the following items are excluded from this warranty: wind exceeding 73 mph, lightning, hail, fire or physical damage from falling or wind-blown objects. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the Roofing Subcontractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything on the roof, this Guarantee shall become null and void upon the date of said alterations. If the Owner/User Agency engages the Roofing Contractor to perform said alterations, the Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner/User Agency in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a termination of this Guarantee.

3. During the Guarantee Period, if the original use of the roof is changed and it becomes used for, but for which it was not originally designed or specified, as a promenade, work deck, spray-cooled surface, flooded basin, or other use of service more severe than originally specified, this Guarantee shall become null and void upon the date of said change.

4. During the Guarantee Period, if any building or area of a building is changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this guarantee shall become null and void upon the date of said change.

5. The Owner/User Agency shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects or deterioration, and shall afford reasonable opportunity for the Roofing Contractor to inspect the Work, and to examine the evidence of such leaks, defects or deterioration.

6. This Guarantee is recognized to be the only guarantee of the General and Roofing Contractor on said work, and shall not operate to restrict or cut off the Owner from other remedies and recourses lawfully available to him in case of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of his responsibility for performance of the original work, regardless of whether the Contract was a Contract directly with the Owner or a Subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____
day of _____, 20____.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone (_____)_____ Email _____

Witness:_____ Witness:_____

And has been countersigned by the General Contractor issuing the Roofing Contractor's Subcontract for said work:

Name of General Contractor: _____

Date: _____ Authorized Signature: _____

Typed Name: _____

Representing: _____

Telephone (_____)_____ Email _____

Witness:_____ Witness:_____

R-3 ROOFING GUARANTEE (Metal)

OWNER: Louisiana Community and Technical College System
LCTCS Facilities Corporation
265 South Foster Drive
Baton Rouge, Louisiana 70806

Whereas _____

Address _____

Telephone (_____)_____ Email _____

herein called the Contractor, has provided pre-formed, pre-finished metal roofing, flashing, accessories and miscellaneous items required for a complete roof system installation in accordance with the Contract Documents for the PROJECT:

Name of Project: _____

Project No. & WBS: _____

User Agency: _____

Location/Address: _____

Name and Type of Building(s): _____ State I.D. _____

Type of System: (Standing Seam, Flat Seam, etc.) _____

Total Roof Area: _____ SF; Total Length of Ridge _____LF

Total Length of Valley: _____LF; Total Length of gutter/fascia trim: _____LF

Date of Acceptance _____Two year Guarantee Expiration _____

AND WHEREAS the Contractor has contracted to guarantee said work against water entry from faulty or defective materials and workmanship for the designated Guarantee period of **TWO (2) YEARS from the Acceptance Date** of the Project;

NOW THEREFORE the Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period the Contractor will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work (including any wetted thermal insulation) resulting from water entry or faults or defects of said Work as are necessary to maintain said Work in watertight conditions and further, respond on or within TWO (2) working days upon written notification of leaks or defects by the Owner/User Agency.

This Guarantee is made subject to the following terms and conditions:

1. Damage to the roof caused by the following items are excluded from this warranty: wind exceeding 73 mph, lightning, hail, fire or physical damage from falling or wind-blown objects. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.

2. During the Guarantee Period, if the Owner/ User Agency allows alteration of the Work by anyone other than a Contractor approved in writing by the original Contractor and/or Roofing Material Supplier prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything (i.e. signs) onto the roof, this Guarantee shall become null and void as of the date of said alterations. If the Owner/ User Agency engages the original Contractor for said alterations, the Guarantee shall be maintained in force unless the Contractor presents written notification to the Owner that the intended work will likely damage or cause deterioration of the base work, thereby justifying a termination of the original Guarantee.

3. The Owner/User Agency shall promptly notify the Contractor in writing of observed, known or suspected leaks, defects, or condition deterioration and shall afford a reasonable opportunity for the Contractor to inspect the work and examine evidence of such leaks, defects or deterioration.

4. This Guarantee is recognized to be the only guarantee of the Contractor of said work, and shall not operate to restrict or cut-off the Owner from any other remedies and recourse lawfully available to him in case of roofing failure to any cause or degree. Specifically, this Guarantee shall not operate to relieve the Contractor of his responsibility for the performance of the original work.

IN WITNESS THEREOF, this instrument has been duly executed

this _____day of _____, 20____.

Contractor's Signature: _____

Typed Name: _____

Telephone (_____)_____ Email _____

Witness:_____ Witness:_____

And if applicable, is countersigned by the following Sub Contractor, Installer, or other party (as indicated) who acted as agent or represented the Contractor during the performance of the work:

Countersignee Name: _____
(Type or Print)

Date: _____ Signature: _____

Representing: _____

Address:_____

Telephone (_____)_____ Email _____

Witness:_____ Witness:_____

Louisiana Community and Technical College System
LCTCS Facilities Corporation

TWENTY (20) YEAR WEATHERTIGHTNESS
METAL ROOF SYSTEM - LIMITED WARRANTY

We, *ManufacturerName* the manufacturer; warrants to the State of Louisiana herein referenced as "Owner" of the building described below that subject to the terms, conditions, limitations and warranty responsibility stated herein ; Manufacturer warrants with no dollar limit (NDL) the undersigned Contractor workmanship and material defects, and will repair any leaks in the Manufacturer roofing system (Roofing System); and further, agrees to make provisions for satisfactorily drying all wetted thermal roof insulation caused by said leak(s), of the installed roof over the life of this TWENTY **(20) YEAR WARRANTY Period from the Acceptance Date of the Project** (as defined in the Contract Documents).

Satisfactory repair of reported leaks shall not serve to extend the term of the original 20-Year Warranty period for either the repair or the entire Roof System, but rather serve to maintain the Roof System weathertightness condition for the entire term of the original warranty.

Neither Manufacturer nor undersigned Contractor makes any other warranty whatever, expressed or implied. All implied warranties of merchantability and all implied warranties of fitness for any particular purpose which exceed or differ from the warranties herein expressed are disclaimed by each and all of said parties and are hereby excluded from this 20-Year Weathertightness Limited Warranty.

In no event shall Manufacturer be held liable for any commercial loss, claims for labor or consequential damages of any other type not specifically referenced herein, whether owner's claim be based in contract, tort, or strict liability.

TERMS, CONDITIONS, LIMITATIONS

1. A "Leak" is defined as water entry into any location where water entry is not specifically planned for. This can include insulation, cornices, attic spaces and other portions of the building assembly. Water entry through fastener holes, all flashings including valley, hip, ridge, closure, rake, wall runner, eave, curb, pipe penetration and other penetration flashings, and the roof panels and seams (side and end) are to be considered "leaks" as pertains to this weathertightness warranty.

2. Owner shall provide Manufacturer with written notice within THIRTY (30) days of discovery of any leaks in the Roof System; after which date, the principal to this warranty shall be expected to respond to said leak report within a period of TEN (10) working days.

    a) Failure to respond, shall enable the Owner to engage service of "others" to address the problem without jeopardizing Owner's protection under terms of the original warranty.
    b) Further, by Manufacturer's failure to respond as specified, subjects manufacturer to liability for full reimburse to the Owner for all costs incurred to engage the services of "others" in order to protect the building from further damage by roof leak(s).
    c) Manufacturer cannot be held responsible for lack of performance or liable under the terms of this warranty due to Owner's failure to report claims as specified.

3. After a leak report is filed; Manufacturer shall determine whether the leak is caused by defects in manufactured material or in the workmanship and affect the Roof System repair in accordance with repair obligations herein. In the event a determination is made that neither defect in manufactured material or workmanship is at fault, the Owner shall be so advised in writing and permitted to exercise other remedies without jeopardy to provisions of the original warranty.

4. This Guarantee is made subject to the following terms and conditions:
   a) Damage to the roof caused by the following items are excluded from this warranty: wind exceeding 73 mph, lightning, hail, fire or physical damage from falling or wind-blown objects. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.
   b) Deterioration caused by marine (salt water) atmosphere or by regular spray of salt or fresh water.
   c) Corrosion caused by heavy fall out or exposure to corrosive chemicals, ash or fumes from chemical plants, foundries, plating works, kilns, fertilizing manufacture and paper manufacturing plants - if either cause is located less than one-half mile radius distant from the building.
   d) Deterioration caused by corrosive or condensates generated or released from within the building itself.
   e) Damages caused by workers or work activity on the roof after issuance of the warranty.
   f) Structural failures affecting (but not part of) the Roof System.
   g) Unauthorized alterations or modifications of the Work by anyone other than a Contractor agreed to in writing by all parties to this warranty.
   h) Failure of the Owner to exercise reasonable care and maintenance.

5. During the Term of this warranty; and within 72 hours of formal request, the Owner shall permit Manufacturer, or manufacturer's agent access to the roof during regular business hours.

6. Failure of either party to exercise or enforce specific terms, conditions or provisions shall not be construed to be a waiver of same.

7. The Manufacturer shall not be responsible for consequential damage or loss to the building, its contents, or other material as a provision of this warranty.

8. The Manufacturer shall not have any liability or responsibility at any time for, or as a consequence of any condensation or underside corrosion which is or was caused at anytime by any condensation resulting from either or both of the following:
   a) Inadequate ventilation of the attic space between the roof panel and insulation, when insulation is installed on top of existing roof.
   b) The use of inadequate vapor barrier where the insulation is installed immediately beneath roof panels.

9. The Nineteenth Judicial Court in and for the Parish of East Baton Rouge, State of Louisiana shall have sole jurisdiction in any action brought as a result of this warranty by any party hereto.

10. This Warranty instrument supersedes and is in lieu of any and all other expressed or implied warranties that are or may be in conflict with terms and conditions stated herein.

11. An executed Warranty is required prior to Acceptance being issued by Louisiana Community and Technical College System / LCTCS Facilities Corporation for the project.

WARRANTY RESPONSIBILITY

FIRST (1st.) year through the TWENTIETH (20th) year from date of Acceptance of the project by Roof System Manufacturer whose legal entity is Manufacturer; except that the first recourse of the Owner for Warranty Benefits during Year 1 and Year 2 after date of Project Acceptance will be the Contractor per provisions of Roofing Guarantee R-3 (Metal).

EXCEPT AS EXPRESSLY PROVIDED HEREIN, Manufacturer MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO MATERIALS COVERED HEREBY, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, NOR DOES SELLER MAKE ANY WARRANTY OR ASSUME ANY OBLIGATION WITH RESPECT TO THE VALIDITY OF ANY PATENTS, DESIGNS, COPYRIGHTS OR TRADEMARKS WHICH MAY COVER SUCH GOODS EXCEPT; THAT THE OWNER SHALL HAVE THE RIGHT TO RELY ON SAME BY REPRESENTATION OF THE MANUFACTURER THAT BY OFFERING THE MATERIAL, ROOF SYSTEM AND MISCELLANEOUS ITEMS FOR THE PURPOSES OF THIS PROJECT THERE IS NO VIOLATION OF THE RIGHTS OF OTHER PARTIES WITH RESPECT TO PATENTS, DESIGNS, COPYRIGHTS OR TRADEMARKS, FURTHER; THE CONDITIONS OF LIABILITY, RIGHTS, OBLIGATIONS AND REMEDIES OF THE PARTIES RELATING TO CLAIMS ARISING FROM DEFECTIVE GOODS SHALL BE GOVERNED EXCLUSIVELY BY THE TERMS HEREOF: THIS WARRANTY MAY NOT BE CHANGED ORALLY.

IN CONSIDERATION FOR PAYMENT RECEIVED, THIS WARRANTY IS TENDERED FOR THE BENEFIT OF THE OWNER AND IS NOT TRANSFERABLE OR ASSIGNABLE WITHOUT THE WRITTEN CONSENT OF THE MANUFACTURER Manufacturer .

THIS WARRANTY REQUIRES THE ORIGINAL SIGNATURES OF AN OFFICER OF THE MANUFACTURER, AND THREE FULLY EXECUTED COPIES WILL BE PROVIDED TO THE OWNER AS A PREREQUISITE FOR PROJECT ACCEPTANCE. THE OWNER'S SIGNATURE SHALL NOT BE A REQUIREMENT FOR IMPLEMENTATION OF, OR CAUSE TO VALIDATE THE WARRANTY.

A SEPARATE AND INDEPENDENT WARRANTY SHALL BE ISSUED FOR EACH BUILDING OR INDEPENDENT ROOF SYSTEM IN THE CASE OF MULTIPLE BUILDINGS OR MIXED ROOFED PROJECTS.

PROJECT DATA / SIGNATORS

Building/Project Description: _____

Roof Type and Quantity: _____

Location: _____

State I.D. (if Exist. Bldg.): _____

Site Code: _____

State Project No. & WBS: _____

Date of Project Acceptance/Commencement of Warranty: _____ Ends: _____

Manufacturer:

Manufacturer

S_____ Title_____ Date_____

ADDITIONAL PARTIES FOR FILE AND RECORD

File Reference:
Contractor or
Roofing Contractor

Name: _____

Address: _____

Phone No.: _____

File Reference #2:
Contractor or
Roofing Contractor

Name: _____

Address: _____

Phone No.: _____

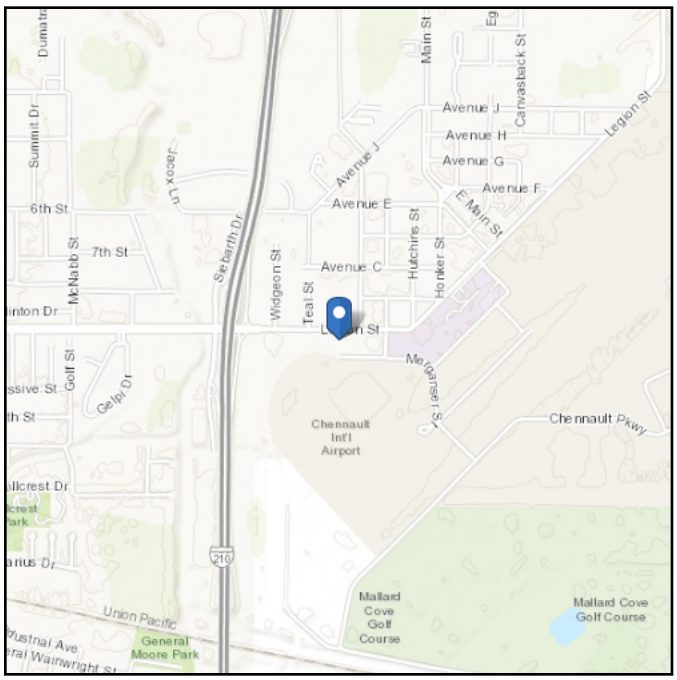
Direct to:
(Owner)
LOUISIANA COMMUNITY AND TECHNICAL COLLEGE SYSTEM
LCTCS FACILITIES CORPORATION
265 South Foster Drive
Baton Rouge, Louisiana 70806

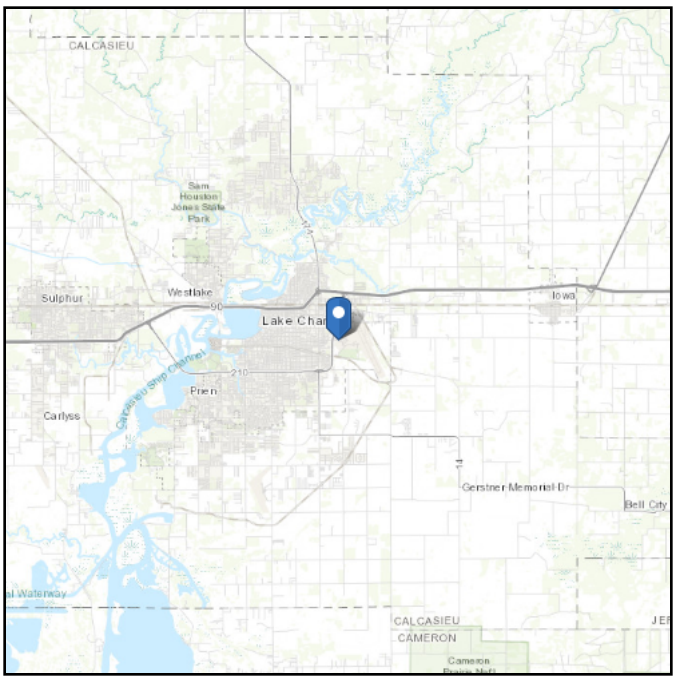
ASCE Hazards Report

Address:
Sowela Phillips 66 Process Technology Building - 3500 Senator J Bennett Johnston Avenue
Lake Charles,

Standard: ASCE/SEI 7-16
Risk Category: III
Soil Class: E - Soft Clay Soil

Latitude: 30.2163
Longitude: -93.1664
Elevation: 9.94736785768584 ft (NAVD 88)





Wind

Results:

Wind Speed	141 Vmph
10-year MRI	75 Vmph
25-year MRI	87 Vmph
50-year MRI	97 Vmph
100-year MRI	106 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Sun Mar 15 2026

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings in health-care facilities shall be protected against wind-borne debris as specified in Section 26.12.3.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Louisiana South State Plane Coordinate System FIPS 1702. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services, NOAA, N/NGS12
National Geodetic Survey SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Calcasieu Parish, Louisiana.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** No Base Flood Elevations determined.
- **ZONE AE** Base Flood Elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 (EL 987) Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4775000mE 1000-meter Universal Transverse Mercator grid ticks, zone 15
- 6000000 FT 5000-foot grid values: Louisiana State Plane coordinate system, South Zone (FIPSZONE = 1702), Lambert projection
- DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
February 18, 2011

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0485F

FIRM

FLOOD INSURANCE RATE MAP

CALCASIEU PARISH, LOUISIANA

AND INCORPORATED AREAS

PANEL 485 OF 715

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CALCASIEU PARISH	220037	0485	F
LAKE CHARLES, CITY OF	220040	0485	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
22019C0485F
EFFECTIVE DATE
FEBRUARY 18, 2011

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

93°10'18"W 30°13'14"N

93°9'41"W 30°12'43"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 — Cross Sections with 1% Annual Chance
- 17.5 — Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/24/2026 at 4:28 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Geotechnical Engineering Report

SOWELA Process Technology (P-Tech)
Building Addition
3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana

for

Champeaux Evans Hotard Architects
702 Dr. Michael DeBakey Drive
Lake Charles, LA 70601

prepared by

Daniel J. Holder, P.E., Inc.
Consulting Geotechnical Engineer
2767 Scarborough Drive
Lake Charles, LA 70615

DJH File 25-036
09 November 2025

Daniel J. Holder, P.E., Inc.
Consulting Geotechnical Engineer

2767 Scarborough Drive
Lake Charles, LA 70615
dan@danholderpe.com
337-274-4125

09 November 2025

Champeaux Evans Hotard Architects
702 Dr. Michael DeBakey Drive
Lake Charles, LA 70601

Attn: Mr. Brad Evans, A.I.A.

RE: Geotechnical Engineering Report
SOWELA Process Technology (P-Tech) Building Addition
3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana
DJH File 25-036

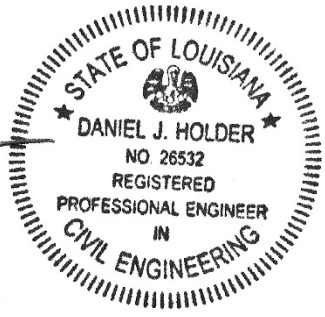
Dear Mr. Evans:

We have completed the Geotechnical Engineering Report for the referenced project, and are submitting the same herewith. This work was performed in general accordance with our written scope of work dated 30 September 2025, which was authorized in an e-mail from your office dated 07 October 2025.

Please advise if you have any questions regarding this information, or if I may be of any additional assistance. It has been a pleasure working with you on this project.

Sincerely,

Daniel J. Holder, P.E.
Louisiana P.E. Reg. No. 26532



Report Distribution:

Mr. Brad Evans, A.I.A.; Champeaux Evans Hotard Architects: 1 electronic file (.PDF)
Mr. Beau Pleasant, P.E.; Duhon & Pleasant: 1 electronic file (.PDF)

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APPENDIX

Geotechnical Engineering Report

SOWELA Process Technology (P-Tech) Building Addition
3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana

DJH File 25-036; 09 November 2025

PROJECT INFORMATION

1. Description of Project. According to the information provided for our use, we understand that this project will consist of a new, one-story, building addition, a new truck drive and dumpster pavement area, and new passenger car driveway addition. The new building addition will be about 50 by 72 feet in plan, and likely be constructed of steel frame with precast concrete wall panels to match the existing building. Drilled shafts are expected to support the building columns, with load bearing grade beams for walls. Portland cement concrete will be used to match existing pavements. Site grades are expected to be raised about a foot or less to match adjacent finished floor elevations; relatively little grade changes are expected for the pavements.

The new building addition will be located on the south side of the existing building, which is at 3500 Sen. J. Bennett Johnston Avenue, in Lake Charles. Refer to the Site Vicinity Map (Figure 1), the Aerial Photograph / Boring Location Plan (Figure 2), and the Site Plan / Boring Location Plan (Figure 3) in the Appendix.

RESULTS OF INVESTIGATION

2. General. This investigation included the following work activities.

- a review of available geologic information;
- a site reconnaissance by the project engineer;
- one (1) soil boring to about the 40 foot depth in the building area, one (1) to the 15 foot depth for the truck drive and dumpster pavement area, and one (1) to the 10 foot depth for the passenger car driveway addition;
- laboratory testing of selected soil samples;
- engineering analyses and evaluations; and,
- the preparation of this report by the Geotechnical Engineer.

The locations of the soil borings are shown on Figures 2 and 3, and the Soil Boring Logs are included in the Appendix. The results of the field and laboratory testing programs are shown on the Soil Boring Logs, and on other figures in the Appendix, where applicable. Finally, a Description of the Field and Laboratory Testing Procedures is also included in the Appendix.

3. Site Conditions. The site conditions described in this section are based on our field observations, and a review of available topographic and geologic data and historical aerial photographs of the site, as discussed below.

3.1 Field Observations. The site is located immediately south of the existing P-Tech building, which was built circa 2012. The majority of the new site is currently paved with concrete for faculty parking, which includes a driveway to access Mallard Cove Street to the south. A relatively deep (2 to 3 feet or so) open ditch is located between the parking lot and Mallard Cove Street, with a culvert pipe underlying the driveway. An open grassy area is located west of the parking lot, where the new truck drive and dumpster pavement area is to be constructed. Site grades generally drop down nominally from the existing building pad in all directions, ultimately draining into the open ditch.

3.2 Topography. It is estimated that the center of the planned building addition location is at an approximate latitude and longitude of N 30° 12.959' and W 93° 09.990', respectively. The appropriate U.S.G.S. Topographic Map (i.e., Figure 1) indicates that the site is at an elevation of about EL +10 or so. No other topographic information was provided for our use.

3.3 Geology. According to the Geologic Map of Louisiana (Pope, et al, 1984), the site is underlain by the Prairie Formation of Pleistocene Age. The Pleistocene Age ended some 11,700 years ago, corresponding to the end of the last glacial period. The Prairie Formation soils are described as "Light gray to light brown clay, sandy clay, silt, sand, and some gravel."

3.4 Historical Aerial Photographs. According to historic aerial photographs available on the Calcasieu Parish Police Jury GIS Mapping Application (i.e., Figure 2), the project area has remained relatively unchanged since at least about the 2012 photograph, when it appears that the construction of the new P-Tech Building and concrete pavement had been recently completed. Prior to that, until at least the 1983 photograph, it appears that the site consisted of a grassy lawn (some features are evident in the yard, but not in the area of the new addition). In the 1974-1975 and 1963 photographs, it appears as though there may have been a structure located on the site, but these photographs are of poor resolution. The 1953 photograph is whited out, and in the 1940 photograph, the entire area consists of a rice field with small "pimple mounds" (pimple mounds are low, rounded hills found in the coastal prairies of southwestern Louisiana and eastern Texas, and are a feature of the prairie grasslands ecosystem). For more information, please refer to the on-line CPPJ GIS Mapping Application.

Please note that this discussion of site conditions is necessarily general in nature, and that a comprehensive description of current or previously existing site conditions is beyond the scope of this investigation. Reference is made to Figures 1, 2 and 3 in the Appendix, and the other sources noted herein.

4. Soil and Ground Water Conditions. The soils encountered in the soil borings made for this project are described in detail on the Soil Boring Logs in the Appendix, and are summarized as follows.

Generalized Soil Profile[1]

Strata	Depth[2] of Strata (ft) B-1	B-2	B-3
8" CONCRETE; 2" GRAVEL BASE	0 to 1	n / a	n / a
FILL – Stiff to firm dark brown, bluish gray & brown and mottled reddish brown and dark brown w/ gray SILTY CLAY (CL) – fair	1 to 8	0 to 2	0 to 2
Stiff dark gray to black SILTY CLAY (CL)	n / a	2 to 4	2 to 4
Firm to stiff gray w/ tan SILTY to SANDY CLAY (CL)	8 to 9	4 to 6	4 to 10
Stiff to firm / medium dense reddish brown very SANDY CLAY (CL) to CLAYEY fine SAND (SC)	9 to 12½	6 to 10	n / a
Firm to stiff reddish brown SILTY CLAY (CL) to CLAY (CH)	12½ to 22	10 to 15	n / a
Very stiff to stiff brown CLAY (CH)	22 to 32	n / a	n / a
Stiff dark gray CLAY (CH)	32 to 40	n / a	n / a

[1] Soil Stratification Varied. Refer to Boring Logs in Appendix.
[2] Depths Measured From Existing Ground Surface.

The borings were advanced using dry auger methods to determine the presence of and the hydrostatic conditions of ground water in the boreholes. Ground water was generally first encountered at about the 8 to 9 foot depth, and was observed to rise about 1 to 3 feet or less after a brief (about 15 minute) observation period. The depth to ground water can fluctuate with seasonal variations in rainfall and evaporation, etc., but is typically first encountered in this area from about the 8 to 12 foot depth, and will generally rise to about the 4 to 6 foot depth after a period of time. Much shallower ground water levels (i.e., "perched water") can often be observed after periods of precipitation. The actual depth to ground water should be determined more accurately at the time of construction.

The information contained in this section has been generalized from the data obtained from all of the soil borings made for this investigation, and is meant to provide a general overview of the soil and ground water conditions. For more specific information, refer to the Soil Boring Logs in the Appendix.

GEOTECHNICAL RECOMMENDATIONS

5. General Considerations. Geotechnical aspects of this project include site preparation and earthwork, foundations for the support of the new building addition, and site pavements. These items are discussed in general in this section, and in more detail in the following sections of this report.

5.1 General. Surface drainage appeared to be relatively fair to poor at this site. Establishing and maintaining good drainage will be critical for earthwork and foundation construction at this site; otherwise, significant construction difficulties and/or additional measures (e.g., additional undercutting, subgrade stabilization, etc.) can be expected to be required. Performing earthwork operations during wet weather conditions and/or after long, wet periods should be avoided. Dewatering is not expected to be necessary for shallow excavations (i.e., less than about 2 to 4 feet) at this site. If minor dewatering is required (e.g., after periods of inclement weather, etc.), sump and pump methods may be suitable if large enough pumps are utilized and the contractor is diligent. Otherwise, or for deeper excavations, other measures may be required.

5.2 Site Preparation and Earthwork. In general, stiff to firm silty clay fills and natural silty clays were encountered to about the 6 to 10 foot depth. Ordinarily, we would recommend removing and replacing the fills with new, compacted select fill (at least in the building addition area); however, it is expected that these were probably placed with some compaction effort during the construction of the original building. In any case, no obviously poor materials were observed in the fills sampled for this investigation. The project designers may, at their discretion, consider leaving these fills in place for the support of shallow grade beams and pavements (it is expected that the heavier column loads will be supported by deeper drilled shaft foundations). If poor materials are uncovered in the existing fills during the construction activities, then these fills should be removed from the building addition area to a depth of about 4 feet, and then replaced with new, compacted select fill. The necessity of removing the existing fills from the pavement areas is considered to be less likely, as long as the existing fills can support construction activities.

If the 4 foot undercut in the building area is desired, this undercut, when combined with the new fill that is to be placed to achieve the desired subgrade elevations, should provide a new, uniform building pad of compacted select fill that is at least 4 feet thick (i.e., 2 feet below the bottom of the footings and/or grade beams, and 4 feet below the bottom of the slab). The more new, net fill to be placed, the less undercut that has to be made; however, a minimum of about 2 (to 4) feet of undercut should be anticipated.

Subgrade stabilization / treatment may be required if the underlying clayey subgrade contains large silt pockets and/or is too wet or weak to support further construction activities (e.g., a proofroll, and fill placement and compaction). The need for subgrade

stabilization will be highly dependent upon the moisture condition of the clayey subgrade at the time of the construction activities.

Once a stable subgrade surface is achieved, compacted select fill may be placed as required to establish the desired subgrade elevations. Recommendations for site preparation and earthwork activities are provided in Section 6.

5.3 Shallow Foundations. Once the building pad has been properly constructed, shallow grade beam type foundations should be suitable for the support of the lightly loaded walls and floor slab of the new building addition. The use of a reinforced slab foundation (i.e., a "ribbed slab") is recommended to provide rigidity in the foundation to help resist differential soil movements. The foundation may be conventionally reinforced (with "rebar" and welded wire mesh) or post-tensioned with high strength steel tendons. This approach has been used successfully on many projects in this area, but will not guarantee that some movements won't occur, particularly if extreme conditions of moisture change (e.g., extended droughts or periods of excessive rainfall, etc.) and/or severe loading conditions occur. In any event, the higher the quality of the earthwork construction, and the stiffer the foundation is constructed, the less likely are the chances for the movements described above. Recommendations for shallow grade beam foundations are provided in Section 7.

5.4 Drilled Shaft Foundations. For the column loads, drilled, cast-in-place concrete shafts are recommended, as planned, along with the floor slab-on-grade described above. Drilled shafts are especially suitable for supporting large column loads and resisting lateral loads and overturning moments, and/or with relatively little settlement movement(s). Excavations for drilled shafts in the sandy soils at this site will require full depth drilling slurry to maintain the sides of the excavation (i.e., not cave) and/or prevent "quick" conditions at the base of the excavations. Temporary steel casing may be effective if the casing extends into the underlying clayey soils and achieve a watertight "seal" in same that will allow the shafts to be constructed "in the dry." The contractor should be thoroughly experienced with the use of these drilling techniques and prepared to use same or significant construction difficulties and/or inadequate shaft sections could result. Recommendations for drilled shafts are provided in Section 8.

5.5 Site Pavements. Once the site preparation and fill activities described in Sections 5.2 and 6 are completed, the finished subgrade should be suitable for the support of site pavements. Treatment of the upper 8 to 12 inches or so may be considered to assist with site preparation, if found to be necessary at the time of construction. Recommendations for Site Preparation and Earthwork Activities are provided in Section 6; recommendations for Site Pavements are provided in Section 9.

6. Site Preparation and Earthwork Activities. Site Preparation and Earthwork Activities for this project should be performed in accordance with the following recommendations.

6.1 General. As noted in Section 5, establishing and maintaining good drainage will be critical for earthwork and foundation construction at this site. Poor drainage and/or wet conditions at the time of construction can be expected to cause delays and/or cost overruns due to additional undercutting or stabilization measures. The contractor should be prepared to make every reasonable effort to provide dry working conditions (i.e., cut drainage ditches prior to earthwork activities; thoroughly "process," or dry the subgrade soils, if necessary; and take advantage of dry weather conditions; etc.). Standing water on the subgrade or in any excavations should be promptly drained or pumped off. Another desirable practice is to avoid "opening up" larger areas for earthwork than can be successfully completed before inclement weather conditions occur. A good discussion of the normal earthwork construction methods that should be attempted by the contractor before resorting to undercutting or stabilization measures is provided in Section 203.07.02, Surface Layer Preparation, of the LA DOTD *Louisiana Standard Specifications for Roads and Bridges (LSSRB),* 2016 Edition).

All site preparation and earthwork activities should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in earthwork construction. This should include full-time inspection of the site preparation and testing of fill placement and compaction. Detailed and timely CMT reports should be submitted to this office for a review of compliance to the recommendations contained in this report. These services are considered to be essential for the reliable construction of this project.

6.2 Site Preparation. Any soft, wet, or weak soils that yield excessively under the inspection activities (e.g., a proofroll) or construction operations; or any other unsuitable materials uncovered during the stripping of the project area should be removed as necessary during the site preparation activities.

Additional undercutting and/or subgrade stabilization / treatment may be required if the underlying clayey subgrade contains large silt pockets and/or is too wet or weak to support further construction activities (e.g., a proofroll, and fill placement and compaction). Additional undercutting may also be considered in the building pad area, as discussed in Section 5.2. The need for additional undercutting and/or subgrade stabilization will be highly dependent upon the moisture condition of the clayey subgrade at the time of the construction activities.

The exposed subgrade surface should be inspected to ensure that a suitable surface exists upon which to place select fill, if required. This inspection may include proofrolling the subgrade with a loaded, tandem-axle dump truck or other means as determined by the inspector. The subgrade material will be sensitive to moisture, and could pump and rut excessively if it is wet and/or if exposed to excessive (or even

moderate) construction traffic. Any areas that are determined to be unsuitable for fill placement should be further undercut or treated to achieve a stable subgrade surface. The amount of subgrade exposed at any given time should be limited to that which can be properly processed and backfilled before inclement weather or construction traffic, etc., can deteriorate the approved subgrade.

6.3 Subgrade Treatment. Treatment of the subgrade may be considered, if necessary, to help provide a firm working table upon which to conduct fill operations. Lime treatment should be effective for the underlying clayey fills and natural clayey soils at this site; or possibly for imported clayey fill materials. Treatment to stabilize the subgrade soils should be performed in accordance with *LSSRB*, Section 305, Subgrade Layer. Section 305 requires that soils to be treated contain no more than 79 percent sand or 69 percent silt and have a plasticity index no greater than 35. A better requirement is to limit silt content to less than 60 percent. Section 305 further calls for cement treatment to be performed in accordance with Section 303, In-Place Cement Stabilized and Treated Base Courses; and lime treatment to be performed in accordance with Section 304, Lime Treatment, Type C (in our opinion, Type D, or working table treatment is sufficient for subgrade treatment).

6.3.1 Cement Treatment. Portland cement, treatment is considered suitable for silty soils with a plasticity index of about 7 or less, or for soil-cement base course. Less desirably, Class C Flyash may also be considered. As noted in the preceding paragraph, cement treatment should be performed in accordance with *LSSRB*, Section 303, In-Place Cement Stabilized and Treated Base Courses. Section 303 specifies that the treatment percentage be determined in accordance with *LA DOTD Testing Procedure Manual* TR 432; alternately, the treatment percentage may be determined by test strips constructed and evaluated in the field. A treatment percentage of 4 to 6% (by volume) may be assumed for design purposes for stabilizing the silty soils (10% or more by volume for Class C Flyash); the project documents should allow for an adjustment of the treatment percentage based on the actual treatment percentage utilized. A full depth, in-place mixer (i.e., a stabilizer machine) should be used to pulverize and mix the treated soil. The pulverization should be checked in accordance with TR 431 and meet the requirements of Table 304-1 (i.e., at least 95 percent of the mixed soil particles should pass the ¾ inch Sieve, and 50 percent should pass the No. 4 Sieve).

6.3.2 Lime Treatment. Lime treatment is considered suitable for clayey soils with plasticity indices of about 7 or higher. As previously noted in this section, lime treatment should be performed in accordance with *LSSRB*, Section 304, Type D, Working Table. The treatment percentage should be determined in the lab using a procedure similar to TR 432, or by test strips constructed and evaluated in the field; a treatment percentage of 6 to 8% (by volume) may be assumed for design purposes. The project documents should allow for an adjustment of the treatment percentage based on the results of the lab tests. A full depth, in-

place mixer (i.e., a stabilizer machine) should be used to pulverize and mix the treated soil. The pulverization should be checked in accordance with TR 431 and meet the requirements of Table 304-1 (i.e., at least 95 percent of the mixed soil particles should pass the ¾ inch Sieve, and 50 percent should pass the No. 4 Sieve).

6.4 Select Fill. Once a firm subgrade exists upon which to conduct fill operations, select fill may be placed to achieve the desired subgrade elevation, as required. The new fill surface should extend a minimum horizontal distance of 3 to 5 feet outside the exterior building lines, and should be sloped at a minimum of 10 Horizontal to 1 Vertical (10H:1V), but no steeper than 3H:1V, to facilitate drainage away from the completed building foundations and pavements.

Ideally, select fill should consist of a silty or sandy clay with a Liquid Limit of 30 to 42 and a Plasticity Index of 12 to 22. The natural soils encountered in the soil borings made for this investigation, at least at some locations and depths, significantly exceed these specifications. In general, those soils described as silty or sandy clays (i.e., CL) on the boring logs are close to meeting the recommended limits; soils described as clays (i.e., CH) are not suitable for use as select fill in their present state.

Natural clayey soils that do not meet these requirements can be blended (e.g., with sand) and/or treated (e.g., with lime) for improvement. Lime treatment is also commonly used to expedite fill operations (e.g., to reduce excess moisture). Natural clayey soils used for blending and/or lime treatment should have a maximum liquid limit of 55 and plasticity index of 35 or less. Lime treatment should be performed in accordance with *LSSRB*, Section 304, Type C Treatment. The treatment percentage should be determined using procedure TR 416, or by test strips constructed and evaluated in the field. A suitable in-place mixer (i.e., a stabilizer machine) should be used for all blending and treatment operations. Pulverization should be checked in accordance with TR 431; at least 70 percent of the mixed soil particles should pass the No. 4 sieve. In any case, the proposed fill material and processing procedures should be approved by the engineer before fill placement takes place.

The fill should be placed in 6 to 8 inch thick loose lifts or less and compacted to 95% of the Standard Proctor Maximum Dry Density at ±2% of the Optimum Moisture Content (ASTM D 698). All lifts should be placed on relatively flat, uniform surfaces; fill that is placed against existing slopes should be “benched” into the existing soils in steps at least 2 feet wide and no more than 1 lift thick. Each lift should be tested to ensure compliance with these recommendations prior to placing subsequent lifts. A minimum testing frequency of one test per 2,500 square feet, but not less than 3 tests, per lift is recommended. All completed lifts of fill should be protected from adverse weather and construction traffic, etc., and any areas that are adversely affected should be reworked as necessary to re-establish the recommended compaction criteria before placing additional fill.

7. Shallow Foundations. Following the completion of the Site Preparation and Earthwork activities described in Section 6, shallow grade beam type foundations should be suitable for the support of the lightly loaded walls and floor slab of the new building addition, as described in Section 5.2. (For the column loads, drilled, cast-in-place concrete shafts are recommended, along with the floor slab-on-grade described herein.) A reinforced slab foundation is recommended for the building addition to help accommodate soil movements.

7.1 Reinforced Slab (or "Ribbed") Foundation. A reinforced slab foundation consists of a monolithic slab-on-grade with turned-down edges (perimeter grade beams); interior grade beams may be included if required by the building loads and/or stiffness considerations. The perimeter grade beams function as shallow foundations to carry the exterior wall loads and serve to cutoff moisture fluctuations in the soils supporting the slab from the surrounding environment. Interior grade beams serve to stiffen the slab system, allowing it to better accommodate movements in the supporting soils. Interior grade beams should be located beneath any load bearing interior walls and/or columns, in which case they should be designed as a shallow foundation. The spacing and dimensions of the interior grade beams should be determined by the structural engineer, if applicable; typically, a maximum spacing of 15 feet or less (each way) is utilized. Adequate reinforcement, as determined by the structural engineer, should be provided in the slab-on-grade foundation and grade beams. The entire slab system should be placed monolithically (in one pour), or dowelled to provide equivalent rigidity.

The slab foundations may be reinforced with conventional reinforcing steel (rebar and welded wire mesh) or post tensioned steel tendons (i.e., a post-tensioned slab). The grade beam and slab dimensions and reinforcement of either foundation system should be determined by a qualified design professional knowledgeable in the design of slabs-on-grade.

It is recommended that consideration be given to placing a suitable polyethylene vapor barrier and a granular leveling layer beneath the floor slab. The practice of and the details of using a vapor barrier and/or granular leveling layer beneath slabs are left to the discretion of the project designer.

7.2 Bearing Capacity and Soil Movements. Shallow foundations for load bearing grade beams should bear within the new, properly placed and compacted fill pad as described in Sections 5 and 6. Shallow foundations for load bearing grade beams bearing designed in accordance with these recommendations may be designed for a maximum net allowable soil bearing capacity of 1,800 pounds per square foot (psf); capacities for column footings may be increased to 2,300 psf. (Heavier column loads, e.g., for the building columns, should be supported by drilled shaft foundations.) The exterior grade beams should extend to a depth of at least 2 feet below finished exterior grades to help minimize moisture fluctuations in the foundation soils.

Net allowable soil capacities take into account the weight of the concrete and backfill below grade; thus, no adjustments to the design loads are necessary. The bearing capacities provided in this section include a factor of safety of at least 2 against shear failure of the bearing soils. A minimum footing or grade beam width of 18 inches (24 inches for isolated footings) is recommended to minimize the possibility of shear "punch" failure of the bearing soils.

Post-construction soil movements from normal foundation settlements are expected to be on the order of one inch or less. Differential movements should be about one-half to two-thirds of the total observed movement.

7.3 Rectangular Footings and Overturning. Capacities for rectangular footings may be increased according to the following formula:

$$q_r = q_w (1 + 0.3\ B/L)$$

where q_r = net allowable bearing pressure for rectangular footings (psf)
q_w = net allowable bearing pressure for continuous footings given in Section 7.2 (psf)
B = footing width
L = footing length (L>B)

Resistance to overturning loads should only consider the ***effective*** footing area, i.e., the portion of the footing centered beneath and effective in carrying the load.

The equivalent footing dimensions B' and L' of the effective footing area are defined as:

$$B' = B - 2e_B \qquad \text{and} \qquad L' = L - 2e_L$$

where e_B and e_L are the eccentricity in each direction. Eccentricity is defined as the moment (M) divided by the axial load (P), or

$$e_B = M_B / P_B \qquad \text{and} \qquad e_L = M_L / P_L$$

7.4 Lateral Loads. Lateral loads on the foundation will be resisted by sliding resistance between the base of the foundation and the underlying soil and by lateral earth pressure against the side of the foundation; the latter should be neglected for shallow foundations for this project (i.e., for foundations of 2 to 4 feet deep or less). The allowable sliding resistance, $f_{s,\,all}$, may be taken as 0.2 times the applied bearing pressure, not to exceed a value of 250 psf. This is an allowable value; a safety factor of about 1½ to 2 against sliding resistance has already been included.

7.5 Uplift Loads. Foundations placed to depths of about 4 feet or less should be designed for uplift by taking into account the dead weight of the concrete and any overlying backfill. A typical unit weight of 120 pounds per cubic foot (pcf) should be utilized for the soil backfill if properly placed and compacted (refer to Section 6). Granular soils should not be used for backfill over foundations subject to uplift because the soils could become saturated if poor drainage exists. Buoyant unit weights (i.e., subtract the unit weight of water, 62.4 pcf) should be used for uplift calculations if proper drainage cannot be assured.

7.6 Construction Considerations. Shallow excavations (i.e., 4 feet deep or less) for foundations in newly placed select fill placed in accordance with Section 6 of this report should remain stable (i.e., should not cave) for short periods of time, particularly in the absence of surface or ground water. Deeper excavations, excavations in sandy soils, or excavations that remain open for longer periods of time could be subject to significant ground or surface water intrusion.

The reinforcing steel and concrete for the foundations should be placed expeditiously following the completion of the excavation. The excavations should not be permitted to stand open any longer than necessary. Any water that may accumulate in the excavations should be pumped out immediately.

The soils at this site will become significantly weaker if wetted or disturbed during the construction operations. Traffic in the excavations should be prohibited, and drainage should be provided to direct surface and ground water (if any) away from the excavations. If the concrete for the foundation will not be placed on the same day as the excavation, a “mud mat” of lean concrete should be placed to protect the bearing surface.

According to OSHA regulations (CFR 1926.650 through 1926.652, and Appendix A to Subpart P), the contractor is responsible for developing and maintaining the appropriate safety systems for excavations on the project. The soils should be classified as Type C for this purpose. Recommendations for temporary slopes and/or shoring are beyond the scope of this investigation, but can be provided upon request once more specific design details are available.

All excavation and concreting operations should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in shallow foundation construction. This should include full-time inspection of the foundation excavations and testing of concrete placement. Detailed and timely CMT reports should be submitted to this office for a review of compliance to the recommendations contained in this report. These services are essential for the reliable construction of shallow foundations for this project.

8. Drilled Shaft Foundations. As noted in Section 5, drilled, cast-in-place, concrete shafts are expected for the support of the columns for the new building addition. Drilled shafts are particularly suitable for resisting the lateral loads and overturning moments, if applicable.

Straight-sided drilled shafts should be utilized for this project; belled (underreamed) shafts are not recommended. Excavations for drilled shafts in the sandy soils at this site will require full depth drilling slurry to maintain the sides of the excavation (i.e., not cave) and/or prevent "quick" conditions at the base of the excavations. Temporary steel casing may be effective if the casing extends into the underlying clayey soils and achieve a watertight "seal" in same that will allow the shafts to be constructed "in the dry." In any event, the contractor should be thoroughly experienced with the use of these drilling techniques and prepared to use same or significant construction difficulties and/or inadequate shaft sections could result. Refer to Section 8.5 for construction considerations.

8.1 Axial Capacity. The compressive axial capacity of drilled shafts is derived from skin friction at the soil-shaft interface and end bearing. Uplift resistance is provided by skin friction and the buoyant weight of the shaft.

Static capacity analyses have been made using field and laboratory strength values, along with local soil strength correlations and experience. The top 4 feet or so has been neglected to account for surface effects and/or for clearance for pile caps and/or grade beams.

A number of shaft diameters and embedment depths were considered in order to allow the project designer to select the most suitable shaft geometry for the specific loading conditions. These values are tabulated below. The allowable shaft capacities include factors of safety of 2 and 2.5 for skin friction and end bearing in compression, respectively, and 2.5 for skin friction in uplift. The buoyant unit weight of the shaft is also included in the provided uplift capacities, along with a factor of safety of 1.1. Capacities for intermediate diameters and/or depths may be interpolated from the table, if desired.

Allowable Compression/Uplift Loads for Single Drilled Shaft Foundations (kips)

Depth [1] (ft)	18 Inch Diameter	24 Inch Diameter
10'	18 / 12	26 / 16
15'	31 / 22	44 / 30
20'	48 / 34	69 / 46
25'	62 / 46	87 / 63
30'	77 / 58	106 / 79

[1] Depth Measured Below Top of Existing Ground Surface.

All shaft capacities cited in the table are based on good quality construction procedures being utilized. Sufficient full depth reinforcement, as determined by the structural engineer, is required to develop the full tensile capacity of the shaft.

8.2 Settlement. Total settlements for drilled shaft foundations designed and constructed in accordance with these recommendations are estimated to be about one half inch or less. Differential settlements between adjacent shafts should be about one-half to three-quarters of the observed total settlement.

8.3 Lateral Loads and Overturning Moments. It is not known if the tops of the drilled shafts for the building addition, if applicable, will be subject to lateral loads and/or overturning moments, or if these forces will be resisted by the structure itself (e.g., interior grade beams). The evaluation of lateral loading and overturning moments on drilled shafts can be complex and time consuming for a large number of shaft geometries, such as that provided in Section 8.1. Once the final loading conditions on the drilled shafts are known, this office should be contacted for further evaluation.

8.4 Shaft Spacing and Group Effects. Shafts should be spaced a minimum of 2.5 to 3 diameters center-to-center or 5% of the shaft length, whichever is greater. Large groups of shafts are not anticipated; however, if groups of 5 or more shafts are utilized, the Geotechnical Engineer should be permitted to evaluate group efficiencies.

8.5 Construction Considerations. Excavations for drilled shafts in the sandy soils at this site will require full depth drilling slurry to maintain the sides of the excavation (i.e., not cave) and/or prevent “quick” conditions at the base of the excavations. Temporary steel casing may be effective if the casing extends into the underlying clayey soils and achieve a watertight “seal” in same that will allow the shafts to be constructed “in the dry.” . In any event, the contractor should be thoroughly experienced with the use of these drilling techniques and prepared to use same or significant construction difficulties and/or inadequate shaft sections could result.

Drilling slurry should be introduced into the excavation immediately upon drilling, and maintained at full depth during the drilling and concreting operations. The excavation and concrete placement should proceed as expeditiously as possible. Once the excavation is started, it should be completed and concrete placed without delay. The slurry should be premixed and brought to the proper consistency, etc., before introducing into the excavation. The drilling tools (augers) should be designed such that the slurry can pass freely around or through the tool as the auger is withdrawn, and the auger should be operated slowly enough that suction does not develop beneath the auger and cause caving. The bottom of the excavation should be cleaned out with an air lift pump or similar device; a clean-out bucket is not recommended. Prior to cleanout, the slurry should be allowed to stand undisturbed for about 15 to 30 minutes to allow all suspended solids to settle out.

The reinforcing steel and concrete for the shaft should be placed immediately after the clean out operations are complete. The reinforcing cage should be fixed in place with centralizers or other means so that it is not disturbed by the concrete placement. If temporary steel casing is used achieve a dry excavation, the concrete may be dropped freely through the excavation, provided it is not permitted to strike any obstructions on the way down and does not land in standing water. A "head" of concrete of at least 5 feet above the bottom of the casing should be maintained while the temporary casing is withdrawn.

If a dry excavation cannot be achieved or drilling slurry is utilized, a full depth tremie should be utilized to place the concrete. The concrete should be proportioned so that it has the proper strength as determined by the project designers, while maintaining a slump of 6 to 8 inches at the time of placement. This is critical to ensure that the slurry is completely displaced, and that no voids remain within the completed shaft. All drilling and concreting operations should be observed by qualified personnel experienced in drilled shaft inspection techniques.

8.6 Floor Slabs and Grade Beams. As long as the site preparation and earthwork activities are properly performed, as described in Section 6, the floor slabs may consist of ground supported slabs-on-grade placed monolithically with exterior and interior grade beams, or as structural floor slabs. The grade beams should be designed to rest upon and span across the drilled shaft foundations. The exterior grade beams should extend to a minimum depth of 2 feet below exterior finished grade to help minimize moisture fluctuations of the soils supporting the floor slab. The interior grade beams may be placed at any convenient depth as required by the structural considerations for the floor slab system. The dimensions and spacing of the interior grade beams should be determined by the structural engineer. Typically, the interior beam spacing matches the drilled shaft layout; in any case, a maximum spacing of 15 feet or less (each way) is generally utilized. Sufficient reinforcement (for both positive and negative moments) and control joint spacing, as determined by the structural engineer, should be utilized.

It is recommended that consideration be given to placing a suitable polyethylene vapor barrier and a granular leveling layer beneath the floor slab. The practice of and the details of using a vapor barrier and/or granular leveling layer beneath the slab are left to the discretion of the designer of record.

According to OSHA regulations (CFR 1926.650 through 1926.652, and Appendix A to Subpart P), the contractor is responsible for developing and maintaining the appropriate safety systems for excavations on the project. The soils should be classified as Type C for this purpose. Recommendations for temporary slopes and/or shoring are beyond the scope of this investigation, but can be provided upon request once more specific design details are available.

All drilling and concreting operations should be inspected and tested by qualified Construction Material Testing (CMT) personnel experienced in drilled shaft construction. This should include full-time inspection of the shaft excavations and testing of concrete placement. Detailed and timely CMT reports should be submitted to this office for a review of compliance to the recommendations contained in this report. These services are essential for the reliable construction of drilled shafts for this project.

9. Pavements. Following the completion of the Site Preparation and Earthwork activities described in Section 6, the prepared subgrade should be suitable for the support of the project pavements. The success of any pavement system depends primarily on the following factors: traffic volume and wheel (or axle) loadings, drainage, construction quality, and regular inspection and maintenance. These considerations are discussed in Section 9.1.

Local experience indicates that Portland cement concrete (PCC) pavements generally perform better than asphaltic concrete (AC) pavements in this area, and thus are recommended for use on this project, as planned. PCC pavements generally require a larger initial investment; however, future maintenance costs are generally less than that of AC pavements. Recommendations for PCC pavements are provided in Section 9.2.

The previous paragraph notwithstanding, properly designed and maintained asphalt pavements can also perform satisfactorily for projects of this type, and are discussed for the project designer's consideration. AC pavements generally involve less initial investment, although greater future maintenance costs are involved. Recommendations for AC pavements, although considered less desirable than PCC pavements, can be provided upon request.

9.1 General Considerations for Pavement Systems.

- *Traffic Loading Conditions*. Pavement sections should be designed to accommodate the anticipated traffic volume and loadings. Overloading pavement sections through excessive wheel loads and/or repetitions will lead to premature pavement failure.

  It is anticipated that traffic loading conditions for this project will be limited to site access and parking for light passenger car and truck traffic occasional delivery trucks at the new driveway addition, and weekly garbage trucks at the truck drive and dumpster pavement area. It is further expected that the larger vehicles will be separated from the parking areas of patron vehicles and limited to specific traffic lanes.

- *Drainage.* Establishing and maintaining good drainage is essential to the successful performance of pavements. Without good drainage conditions, premature pavement failure can be expected. The final subgrade surface should be contoured to channel surface and subsurface water away from the pavements. If site grades allow, the pavement sections should be elevated so that an aggregate base course can drain

freely. Otherwise, a soil-cement base or other such base that will not trap water beneath the pavements should be utilized.

- *Construction Quality.* Quality construction practices and inspection services are essential for the successful installation and performance of pavements. Construction inspection services by Geotechnical Engineer's representative are considered essential for this phase of the project.

- *Inspection and Maintenance.* A regular inspection and maintenance program should be conducted to ensure that the pavement is maintained in good operating condition. The pavements should be inspected regularly to verify that adequate drainage is maintained and that all joints are properly sealed and free of vegetation or debris. When pavement distress is noted, the appropriate measures (e.g., patching, sealing, resurfacing, etc.) should be performed to keep the pavements in good operating condition.

9.2 Portland Cement Concrete (PCC) Pavements. The automobile parking pavement section should consist of 5 inches of concrete (minimum compressive strength of 3,000 psi), traffic lanes should consist of 6 inches of concrete, and pavements subject to heavy truck traffic should consist of at least 8 to 10 inches of concrete. The PCC pavement should be at least 10 inches thick in the dumpster loading zone. All pavement sections should be underlain by suitable base course.

Base course should consist of at least 6 inches of crushed stone or 8 inches of soil-cement (LA DOTD Standard Specifications for Roads and Bridges, Section 302, Class II Base Course). Crushed stone should meet the gradation requirements of Section 1003.03.1 Stone. Locally available products known as 610 Road Base or No. 57 Stone, although not strictly meeting the gradation of Section 1003.03.1, should be suitable for use as crushed stone base course.

A suitable non-woven geotextile (e.g., US Fabrics US 160NW, or equal) should be provided between the crushed stone base course and the subgrade to help provide separation between (i.e., help prevent the mixing of) the base course and subgrade. A suitable composite geosynthetic combining a non-woven geotextile with a biaxial geogrid (e.g., US Fabrics FabGrid® FG1200, or equal) will add strength as well as help provide separation.

If suitable drainage cannot be provided for a crushed stone base course, an 8 inch thick soil-cement base course should be utilized. A treatment percentage of 10% cement (by volume) may be used for planning purposes; however, the appropriate treatment percentage should be determined by additional laboratory testing prior to construction using LA DOTD Testing Procedure Manual TR 432, Methods B or C. Reference is made to Section 6.3.1 for further recommendations for cement treatment.

Appropriate reinforcement as determined by the design engineer should be used and adequate control joint spacing (15 feet or less is suggested) should be observed. Pavements should be isolated from building foundations by means of suitable expansion and/or control joints, if applicable.

All aspects of the pavement design and construction should conform to the American Concrete Institute (ACI) Standard 330R-08: Guide for Design and Construction of Concrete Parking Lots, the LA DOTD Standard Specifications for Roads and Bridges, Section 601 - Portland Cement Concrete, and other applicable engineering specifications.

9.3 General. Note that the pavement sections provided in this report were derived from the experience of this firm based on similar projects that have been observed to perform satisfactorily over the last 20 years. Rigorous pavement designs have not been performed because traffic data was not provided for that purpose. Minor deviations from the pavement sections provided in this section should not necessarily be detrimental to the performance of the pavements at this site, provided traffic is limited to light passenger traffic, a good subgrade is established and fill placement is of high quality, and good construction practices are utilized when constructing the pavements (especially observing minimum specified pavement thicknesses). We will be happy to provide additional analyses for the pavement sections if requested.

OTHER GEOTECHNICAL CONSIDERATIONS

10. Connections to Existing Structures. Connections to existing structures should be designed to allow some vertical movement between the new and existing structures due to minor movements in the soils supporting the new building additions.

11. Drainage and Landscaping. Proper long term drainage should be provided to direct surface water away from the completed foundations and pavements. Underdrains, as well as positive site grading, should be utilized for this purpose as required. Landscaping near the building foundations and pavements should be avoided to minimize fluctuations in the moisture contents of the surrounding soils, or a suitable drainage barrier (e.g., geosynthetic liner) should be utilized. Trees should be located no closer to the building foundations or pavements than the drip line of the mature tree canopy.

12. Additional Consulting Services. The Geotechnical Engineer should be kept informed of and permitted to address all aspects of the soils-related aspects of the project. Often, concerns may arise that are not specifically addressed by the Geotechnical Engineering Report. A brief conference can often address any such concerns, and can identify any other issues not anticipated by the design team.

Upon completion of design, and prior to the start of construction, the Geotechnical Engineer should be provided with the opportunity to review the design drawings and specifications to

assure compliance with the Geotechnical Engineering Report. Such review is considered to be an integral part of the recommendations of this report.

13. Construction Materials Testing (CMT) Services. Construction Materials Testing (CMT) services for this project are essential to assure that the soil conditions do not vary from that assumed in this report and to ensure that the recommendations in this report are followed. These services should be retained by the owner to assure that unbiased reporting is provided. Detailed and timely CMT reports should be submitted to this office for a review of compliance to the recommendations contained in this report. Otherwise, the suitability of these recommendations and/or the performance of the earthwork and foundations for this project cannot be assured by this office.

14. Construction Means and Methods and Contractor Submittals. The Contractor's means and methods can have a substantial effect on the successful execution of the project activities. The Contractor is necessarily responsible for the means and methods employed to accomplish the work scope. Nothing in this report should be construed as dictating the Contractor's means and methods, nor should the project documents dictate the means and methods used by the Contractor.

Certain aspects of the work (e.g., dewatering of excavations, scheduling of work activities, fill placement and compaction, foundation construction, etc.) will require expertise and/or skilled planning and execution on the part of the Contractor. It is advisable that the Contractor be required to submit acceptable work plans for such activities that clearly demonstrate that the Contractor can perform the work satisfactorily. However, it should be clearly understood by all parties that acceptance or acknowledgement of any such submittals does not imply responsibility of the Contractor's means and methods by the engineer(s) or the owner.

15. Limitations. This report is based upon the information provided by the owner's representative, as well as the soil and ground water conditions encountered during the field investigation. Variations may occur away from or between the borehole locations. If such variations become apparent, or if the nature of the project changes significantly, the Geotechnical Engineer should be consulted for additional recommendations.

The recommendations in this report pertain only to the soils-related aspects of the project. The structural design of the foundations is beyond the scope of these services. Likewise, this report does not address the environmental aspects of the project. We would be pleased to assist with these additional services if requested.

16. Compliance with Applicable Standards and Regulations. All geotechnical and related civil aspects of this project should be designed and constructed in compliance with the latest editions of any and all applicable building standards and regulations. These should include but not be limited to concrete and reinforcing steel standards by the American Concrete Institute (ACI), applicable sections of the International Building Code (IBC) and ASCE/SEI 24 (Flood Resistant Design and Construction), safety standards by the Occupational Safety and Health Administration (OSHA), and any other applicable local, state,

or federal building standards, codes or permit requirements. Nothing contained in this report is intended to conflict with or should be construed to supersede any such applicable standards and regulations.

APPENDIX

U.S.G.S. Topographic Map / Site Vicinity Map (Figure 1)

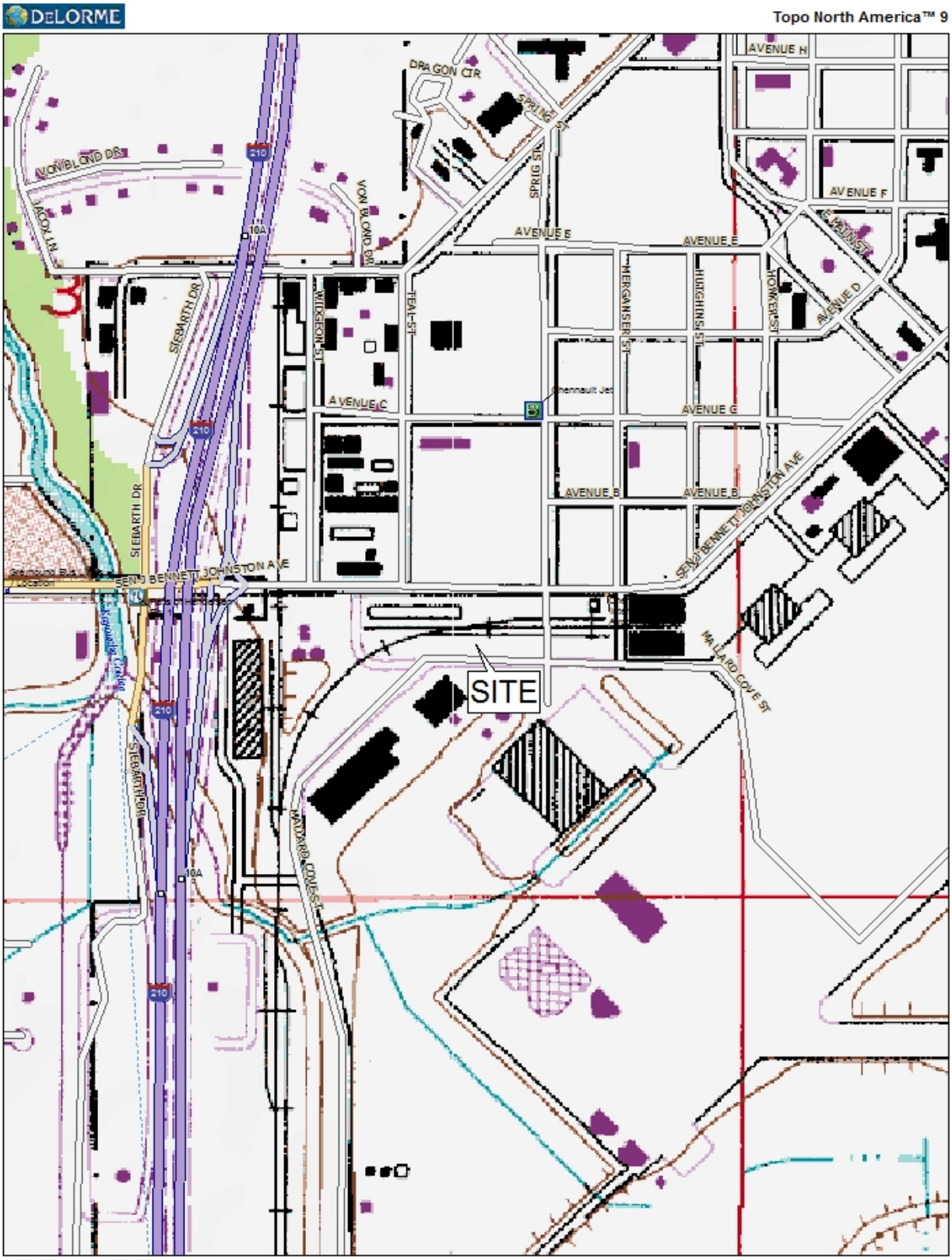
Aerial Photograph / Boring Location Plan (Figure 2)

Site Plan / Boring Location Plan (Figure 3)

Recommended Procedure for New Building Pad (Figure 4)

Soil Boring Logs (3)

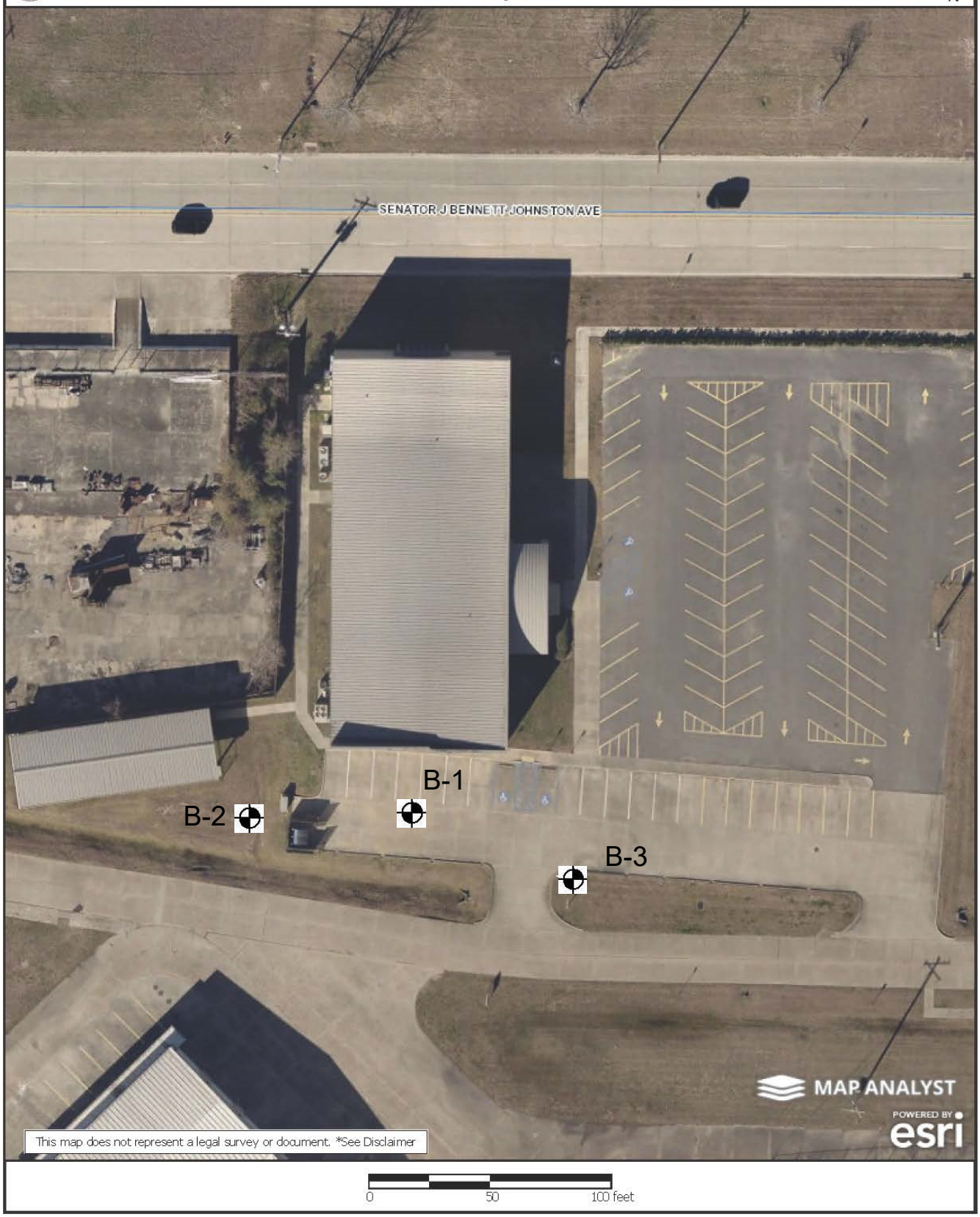
Description of Field and Laboratory Testing Procedures



Daniel J. Holder, P.E., Inc. Consulting Geotechnical Engineer 2767 Scarborough Drive Lake Charles, LA 70615 (337) 274-4125 dan@danholderpe.com	SOWELA P-Tech Building Addition Lake Charles, Louisiana for Champeaux Evans Hotard Architects Lake Charles, Louisiana	Project Engineer: DJH | DJH File No. 25-036 Drawn By: dan | Date: 09 Nov 2025 Checked By: | Figure No. 1 Site Vicinity Map / U.S.G.S. Topographic Map

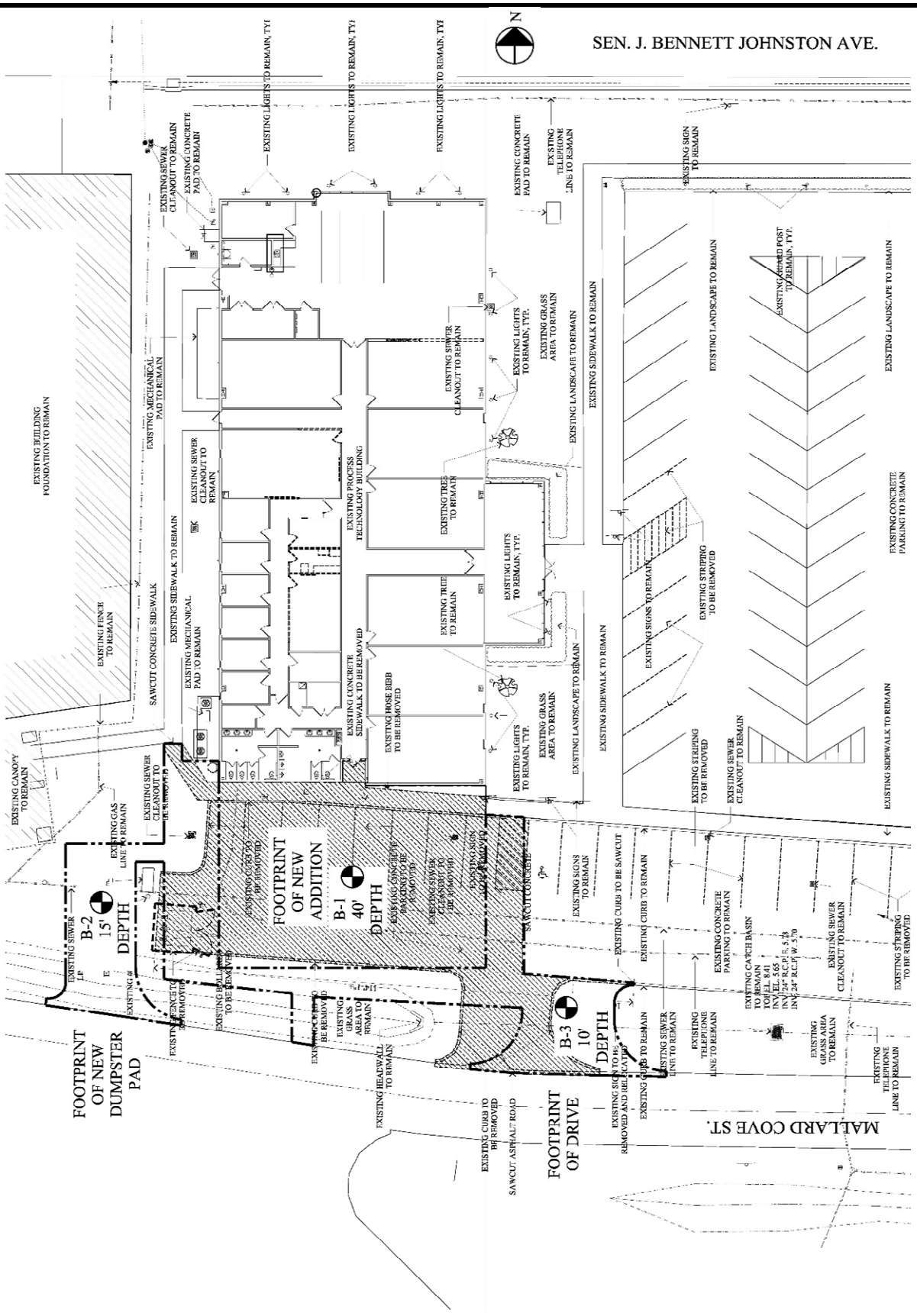
Source: U.S.G.S. 7.5 Minute Topographic Map, 1999 (3-D TopoQuads, DeLorme)

Map



Daniel J. Holder, P.E., Inc. Consulting Geotechnical Engineer 2767 Scarborough Drive Lake Charles, LA 70615 (337) 274-4125 dan@danholderpe.com	SOWELA P-Tech Building Addition Lake Charles, Louisiana for Champeaux Evans Hotard Architects Lake Charles, Louisiana	Project Engineer: DJH Drawn By: dan Checked By: DJH File No. 25-036 Date: 09 Nov 2025 Figure No. 2 Aerial Photograph / Boring Location Plan

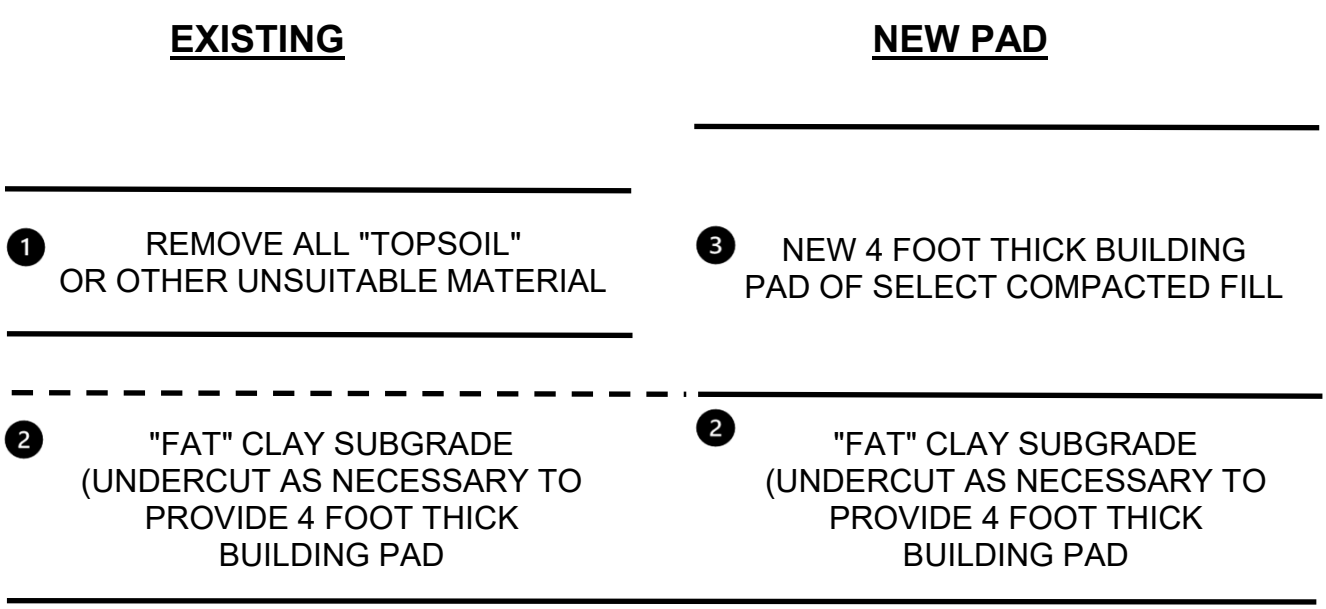
Source: Calcasieu Parish Police Jury GIS Mapping Application - 2024



Daniel J. Holder, P.E., Inc. Consulting Geotechnical Engineer 2767 Scarborough Drive Lake Charles, LA 70615 (337) 274-4125 dan@danholderpe.com	SOWELA P-Tech Building Addition Lake Charles, Louisiana for Champeaux Evans Hotard Architects Lake Charles, Louisiana	Project Engineer: DJH | DJH File No. 25-036 Drawn By: dan | Date: 09 Nov 2025 Checked By: | Figure No. 3 Site Plan / Boring Location Plan

Source: Site Plan Provided by Champeaux Evans Hotard Architects

RECOMMENDED PROCEDURE FOR NEW BUILDING PAD



1. REMOVE ALL "TOPSOIL" OR OTHER UNSUITABLE MATERIAL TO EXPOSE FIRM CLAYEY SUBGRADE.

2. REMOVE (UNDERCUT) ENOUGH "FAT" CLAY SUBGRADE TO PROVIDE AT LEAST 4 FOOT BELOW BOTTOM OF DESIGN FLOOR ELEVATION, AND 2 FOOT BELOW BOTTOM OF ANF FOOTINGS OF GRADE BEAMS.

3. PLACE AND COMPACT NEW, APPROVED SELECT FILL PAD (AT LEAST 4 FOOT THICK) IN 6 TO 8 INCH LOOSE "LIFTS". TEST EACH LIFT IN AT LEAST 3 LOCATIONS FOR COMPACTION AND MATERIAL VERIFICATION.

NOTE: Refer to Sections 5 and 6 of Geotechnical Engineering Report

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SOWELA P-Tech Building Addition
Lake Charles, Louisiana
for
Champeaux Evans Hotard Architects
Lake Charles, Louisiana

Project Engineer:	DJH	DJH File No.	25-036
Drawn By:	dan	Date:	09 Nov 2025
Checked By:	DJH	Figure No.	4

Recommended Procedure
for New Building Pad

SOIL BORING LOG

Boring No. B-1

Project: SOWELA Process Technology Building Addition
Location: 3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana
Client: Champeaux Evans Hotard Architects
Lake Charles, Louisiana

DJH File No: 25-036
Date Drilled: 10/11/2025
Logged By: Dan Holder
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

From Handheld GPS (approximate):
N 30° 12.959'
W 93° 09.990'

Depth (ft)	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γd (pcf)	Moisture Content, w (%)	Atterberg Limits: Liquid Limit, %	Atterberg Limits: Plastic Limit, %	Atterberg Limits: Plasticity Index, %	Notes / Other Tests	Symbol	Description
1												8" CONCRETE; 2" GRAVEL BASE
2	ST	4½ tsf		2.7	115	15	43	19	24	ε_f = 6.4%		FILL - Very stiff dark brown & gray SILTY CLAY (CL), w/ lots of shells
3	ST	3 tsf										
4												FILL - Stiff bluish gray & brown SILTY CLAY (CL) - fair
5	ST	1½ tsf		0.9	102	25	39	17	22	ε_f = 9.3%		
6												FILL - Firm mottled reddish brown, tan, & light & dark gray SILTY CLAY (CL)
7	ST	1 tsf										
8		1½ tsf	▽									FILL - Stiff mottled dark brown, light gray SILTY CLAY (CL) - fair
9	ST	¾ tsf		0.7	107	21				ε_f = 5.7%		
10												Firm light gray very SANDY CLAY (CL)
11	ST	½ tsf										Firm reddish brown w/ light gray SILTY CLAY (CL), w/ black oxides
12												
13												Firm reddish brown very SANDY CLAY (CL) to CLAYEY SAND (SC), w/ light gray silt pockets & black oxides - moist
14	ST	1 tsf		1.0	95	27	46	22	24	ε_f = 4.3%		
15												
16												Firm to stiff reddish brown SILTY CLAY (CL) to CLAY (CH), w/ tan & light gray silt lenses & pockets
17												
18												
19	ST	2¼ tsf		1.6	88	32				ε_f = 5.0%		Stiff reddish brown CLAY (CH), w/ light gray silt streaks
20												
21												
22												
23												
24	ST	2½ tsf		2.1	91	30	66	30	36	ε_f = 2.9%		Very stiff brown CLAY (CH), w/ light gray silt streaks & slickensides
25												

Boring Data

Boring Advancement:
Dry Auger: 0' to 8'
Rotary Wash: 8' to 40'
Boring Abandonment:
Boring Grouted w/ Cement Bentonite Upon Completion

Ground Water Data

▽ Water Level: 8'
▽ After 15 Minutes: 8'
Boring Caved to 8' After 15 Minutes

Sample Type:
ST: Shelby Tube (ASTM D 1587)
SS: Split Spoon (ASTM D 1586)

Notes / Other Tests

ε_f = Failure Strain
uu = Unconsolidated, Undrained Compressive Strength Test (ASTM D 2850)

Soil Stratification is Approximate

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SOIL BORING LOG

Boring No. B-1

Project: SOWELA Process Technology Building Addition
Location: 3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana
Client: Champeaux Evans Hotard Architects
Lake Charles, Louisiana

DJH File No: 25-036
Date Drilled: 10/11/2025
Logged By: Dan Holder
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

Depth (ft)	Field Tests: Sample Type	Field Tests: Penetrometer (tsf) or SPT (bpf)	Field Tests: Ground Water	Laboratory Tests: Qu / UU (tsf)	Laboratory Tests: Dry Density, γd (pcf)	Laboratory Tests: Moisture Content, w (%)	Laboratory Tests: Atterberg Limits: Liquid Limit, %	Laboratory Tests: Atterberg Limits: Plastic Limit, %	Laboratory Tests: Atterberg Limits: Plasticity Index, %	Laboratory Tests: Notes / Other Tests	Symbol	Description
26												
27												
28												
29	ST	2¼ tsf		1.6	94	29				ε_f = 2.1%		Stiff brown CLAY (CH), w/ light gray silt streaks & slickensides (ditto)
30												
31												
32												
33												
34	ST	1 tsf		1.1	74	46	66	32	34	ε_f = 2.1%		Stiff dark gray CLAY (CH), w/ light gray silt pockets & lenses
35												
36												
37												
38												
39	ST	¾ tsf		1.0	69	51				ε_f = 1.1%		- ditto
40												
41												Boring Completed at 40' Depth
42												
43												
44												
45												
46												
47												
48												
49												
50												

Boring Data

Boring Advancement:
Dry Auger: 0 to 8'
Rotary Wash: 8' to 40'
Boring Abandonment:
Boring Grouted w/ Cement
Bentonite Upon Completion

Ground Water Data

Water Level: 8'
After 15 Minutes: 8'
Boring Caved to 8' After 15 Minutes

Sample Type:
ST: Shelby Tube (ASTM D 1587)
SS: Split Spoon (ASTM D 1586)

Notes / Other Tests

ε_f = Failure Strain

Soil Stratification is Approximate

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SOIL BORING LOG

Boring No. B-2

Project: SOWELA Process Technology Building Addition
Location: 3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana
Client: Champeaux Evans Hotard Architects
Lake Charles, Louisiana

DJH File No: 25-036
Date Drilled: 10/11/2025
Logged By: Dan Holder
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

From Handheld GPS (approximate):
N 30° 12.957'
W 93° 10.003'

Depth (ft)	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γd (pcf)	Moisture Content, w (%)	Atterberg Limits: Liquid Limit, %	Atterberg Limits: Plastic Limit, %	Atterberg Limits: Plasticity Index, %	Notes / Other Tests	Symbol	Description
1	ST	4½ tsf		11.1	118	11				ε_f = 2.9% PHTH = neg		FILL - Hard brownish gray SILTY CLAY (CL), w/ lots of large shells - dry, fair
2												
3	ST	1¼ tsf		1.2	104	22	46	19	27	ε_f = 10%		Stiff dark gray SILTY CLAY (CL), w/ brown oxides
4												
5	ST	1½ tsf		1.7	110	19				ε_f = 10%		Stiff light gray w/ tan SILTY CLAY (CL), w/ tan oxides & gray silt streaks
6												
7	ST	1¼ tsf		1.0	110	19				ε_f = 3.6%		Stiff reddish brown w/ light gray very SANDY CLAY (CL), w/ black oxides
8												
9	ST	1¾ tsf										- ditto, grading to CLAYEY fine SAND (SC)
10			▽									
11	ST	1 tsf		0.8	100	25	38	21	17	ε_f = 5.0%		Firm reddish brown SILTY CLAY (CL), w/ black oxides & light gray silt pockets
12												
13			▽									Stiff reddish brown SILTY CLAY (CL), to CLAY (CH), w/ tan & light gray silt lenses & pockets
14	ST	2½ tsf										
15												
16												Boring Completed at 15' Depth
17												
18												
19												
20												
21												
22												
23												
24												
25												

Boring Data

Boring Advancement:
Dry Auger: 0 to 15'
Rotary Wash: n / a
Boring Abandonment:
Boring Backfilled w/ Soil Cuttings Upon Completion

Ground Water Data

▽ Water Level: 13'
▽ After 15 Minutes: 10'
Boring Caved to 10½' After 15 Minutes

Sample Type:
ST: Shelby Tube (ASTM D 1587)
SS: Split Spoon (ASTM D 1586)

Notes / Other Tests

ε_f = Failure Strain
PHTH = Phenolphthalein Indicator

Soil Stratification is Approximate

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SOIL BORING LOG

Boring No. B-3

Project: SOWELA Process Technology Building Addition
Location: 3500 Sen. J. Bennett Johnston Avenue
Lake Charles, Louisiana
Client: Champeaux Evans Hotard Architects
Lake Charles, Louisiana

DJH File No: 25-036
Date Drilled: 10/11/2025
Logged By: Dan Holder
Drilled By: Data Acquisition Services
Equipment: Ardco Top Drive (Buggy)

From Handheld GPS (approximate):
N 30° 12.953'
W 93° 09.977'

Depth (ft)	Sample Type	Penetrometer (tsf) or SPT (bpf)	Ground Water	Qu / UU (tsf)	Dry Density, γd (pcf)	Moisture Content, w (%)	Atterberg Limits: Liquid Limit, %	Atterberg Limits: Plastic Limit, %	Atterberg Limits: Plasticity Index, %	Notes / Other Tests	Symbol	Description
1	ST	4½ tsf				11	27	17	10	PHTH = neg		FILL - Firm dark brown SILTY CLAY (CL), w/ lots of roots & shells - poor
2												
3	ST	1 tsf										Stiff dark gray to black SILTY CLAY (CL), w/ roots & gray silt pockets - poor
4												
5	ST	1 tsf		2.1	111	19	41	19	22	ε_f = 10%		Stiff tan w/ light gray SILTY CLAY (CL), w/ light gray silt pockets
6												
7	ST	1 tsf 2½ tsf	▽									Stiff light bluish gray w/ tan SILTY CLAY (CL), w/ tan to green oxides
8												
9	ST	1¼ tsf 3¼ tsf	▽	1.2	111	18	27	18	9	ε_f = 3.6%		Stiff light gray w/ reddish brown very SANDY CLAY (CL), w/ reddish brown oxides
10												
11												Boring Completed at 10' Depth
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

Boring Data

Boring Advancement:
Dry Auger: 0 to 10'
Rotary Wash: n / a
Boring Abandonment:
Boring Backfilled w/ Soil Cuttings Upon Completion

Ground Water Data

▽ Water Level: 9'
▽ After 15 Minutes: 8'
Boring Caved to 8' After 15 Minutes

Sample Type:
ST: Shelby Tube (ASTM D 1587)
SS: Split Spoon (ASTM D 1586)

Notes / Other Tests

ε_f = Failure Strain
PHTH = Phenolphthalein Indicator

Soil Stratification is Approximate

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Description of Field and Laboratory Testing Procedures

Field Testing Procedures. The borings were located in the field using the information provided by the client's representative and standard GPS and/or taping procedures from relevant physical features shown on the site plan provided for our use. The borings were (initially) advanced using dry auger methods. Soil samples were obtained continuously in the upper 10 foot and on 5 foot centers thereafter. The sample depths and types are recorded on the soil boring logs.

In general, relatively undisturbed "Shelby" tube samples (ASTM D 1587) were taken in clays and silty clays. Undisturbed soil samples are required for strength and density tests, and other properties that are dependent upon the soil being close to its natural state. In this procedure, the boring is advanced to the desired sampling depth, then a 3 inch diameter, thin-walled "Shelby" tube is inserted into the borehole. The tube is then pushed hydraulically about 2 feet into the undisturbed soil. The tube is withdrawn, and the sample extruded with a hydraulic piston. The sample is visually classified and tested with a spring loaded penetrometer, which provides a crude estimate of the unconfined compressive strength. The penetrometer test result is recorded on the soil boring log, and a representative portion of the sample is secured for transport to the laboratory.

In sands and silts, Standard Penetration Tests (ASTM D 1586) are generally made. This test provides a measure of the in-situ density or stiffness of the soil and provides a relatively disturbed sample that may be used for classification testing. In this procedure, the boring is advanced to the desired sampling depth, and a relatively heavy walled "split spoon" sampler is inserted into the borehole. The sampler is driven into the soil using a 140 pound "drop" hammer with 30 inch strokes. The number of blows required to drive each 6 inch increment is recorded. The first increment is a seating drive; the number of blows required to drive the second and third increments are added together to determine the "N-value," which has units of blows per foot (bpf). The N-value and the number of blows per increment are recorded on the soil boring log. The sample is visually classified, and a representative portion secured for transport to the laboratory.

Laboratory Testing Procedures. Representative samples from the field investigation were selected by the project engineer for laboratory testing to determine their relevant engineering characteristics. These tests generally fall into one of the following categories.

Strength Tests. Strength tests generally consist of the Unconfined Compressive Strength, or Qu Test, (ASTM D 2166), and the Unconsolidated, Undrained Triaxial Compressive Strength, or UU Test, (ASTM D 2850). In each of these tests, a cylindrical sample of undisturbed soil is subjected to an axial load until failure occurs, yielding the compressive strength of the soil. The principal difference between the two tests is that the Qu is not confined laterally, which can lead to premature failure, and thus, lower compressive strength values. The UU test is confined laterally in a triaxial cell, typically to the lateral stress that the in-situ soil sample was subject to. The compressive strength and axial strain at failure (ε_f) are recorded on the soil boring log. The confining stress of UU tests is also recorded.

Classification Tests. Common classification tests include the Atterberg Limit Tests and Particle Size Analyses. Atterberg Limit Tests (ASTM D 4318) are performed to determine the consistency (or "clayeyness") of a soil. The Atterberg limits consist of the Liquid Limit (LL) and the Plastic Limit (PL), and the Plasticity Index (PI), which is the difference between the LL and the PL. These values are recorded on the soil boring log.

The Particle Size Analysis Test (ASTM D 422) is performed to determine the distribution of the individual particle sizes of a soil sample. The test is typically performed using mechanical sieves for soils containing gravel and sands, or a "hydrometer" for clayey and silty soils. The results of the Particle Size Analysis are typically plotted on a log scale.

Physical Tests. Common physical tests include the Moisture Content Test (ASTM D 2216) and the Dry Density Test (ASTM D 7263). As the names indicate, these tests determine the moisture content and dry density (or dry unit weight) of a soil sample.

SECTION 011000 - PROJECT SUMMARY, RESPONSIBILITY FOR UTILITY SERVICES & FEES, AND OWNER OCCUPANCY OF THE PROJECT SITE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. This summary is provided as a general overview of the project. The Project shall include all work as detailed in and/or as described by the Contract Documents.
2. Coordination with the Owner's on-going operations.

1.2 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. General Scope of Work:

This project consists of the following general Scope Of Work:

- **Demolition and removal of existing parking, drives, sidewalks, and site improvements, as indicated on drawings.**
- **The Project Consists of the following Major parts, with multiple funding sources, to be broken down as follows:**
  BASE BID - Construction of a new 3,870 Sq.Ft. Addition to the existing Process Technology Building.
  ALTERNATE NO.1 – Interior Renovation of (1) Existing Classroom to become a new Process Control Simulation Lab.
  ALTERNATE NO.2 – Interior Renovation of the existing Faculty Area and (1) Existing Classroom to create a new Conference Room Faculty Work Room, Faculty Restrooms, and additional Faculty Offices.
  ALTERNATE NO.3 – Construction of a New Dumpster Yard and Drive.
- **The Base Bid includes relocation of existing active City Of Lake Charles Sewer Main serving multiple buildings, outside the new building footprint.**
  Note: This work shall be performed and completed prior to beginning work on the new addition building pad. Furthermore, this work shall be coordinated to maintain sewer service to all served buildings at all times. Any shut-down shall be scheduled outside of normal operating hours, and no less than 10 days in advance with agreement of both SOWELA and Chennault, to accommodate the schedules of both.
  Note: This work shall be performed by a Subcontractor licensed in Municipal and Public Works Construction, by the State of Louisiana, and registered and acceptable to the City Of Lake Charles. NO EXCEPTIONS.

- **Relocation of existing active Fiber Optic Communications Line serving the existing PTECH building, outside the new building footprint.**
  Note: This work shall be performed and completed prior to beginning work on the new addition building pad. Furthermore, this work shall be coordinated to service to the existing building. Any shut-down shall be scheduled outside of normal operating houts, and no less than 10 days in advance with agreement of SOWELA to accommodate SOWELA's schedule.

2. Alternates:

   Refer to Specification Section 012300 "Alternates" and the Louisiana Uniform Public Works Bid Form for Alternate pricing required to be provided as part of the Bid.

   A. Alternate No.1 – Interior Renovation of (1) Existing Classroom to become a new Process Control Simulation Lab.

   Alternate No.2 - Interior Renovation of the existing Faculty Area and (1) Existing Classroom to create a new Conference Room Faculty Work Room, Faculty Restrooms, and additional Faculty Offices.

   Alternate No.3 – Construction of a New Dumpster Yard and Drive.

3. Unit Prices:

   Refer to Specification Section 012400 "Unit Prices" and the Louisiana Uniform Public Works Unit Price Form – Unit Price Bid Form for Unit Prices required to be provided as part of the Bid, and Unit Price Extension amounts to be included in the Bid price.

4. Allowances:

   Refer to Specification Section 012100 "Allowances" for Allowances to be included in the Contractor's Bid Price.

5. Responsibility for the following utility services will be as noted below, and that party will bear the cost of any applicable utility service fees for the same:

   a. **Electrical Service to Meter Location –** ***Not Applicable.***
   Contractor shall tie-in to existing Electrical Service, as indicated on drawings.

   b. **Domestic Water Tap & Service to Meter Location –** ***Not Applicable.***
   Contractor shall tie-in to existing Water Service, as indicated on drawings.

   c. **Fire Water Tap & Service to Meter Location –** ***Not Applicable.***

   d. **Sewer Tap & Service to Site –** ***Contractor.***

   e. **Sewer Treatment Plant –** ***Not Applicable.***

   f. **Gas Tap & Service to Meter Location –** ***Not Applicable***

   g. **Internet Service –** ***Contractor***
   Relocate existing Fiber Optic Line serving the existing building. New Fiber Optic Cabling, terminations, and testing, along with head-end Equipment, racks, etc., extended from existing campus data/comm system. Copper distribution wiring, associated terminations, and testing, along with faceplates, patch panels, and racks shall be provided and installed by the Contractor.

   Refer to Special Systems Drawings for equipment provided and installed by Contractor, and equipment provided by the Owner, and installed by Contractor.

   h. **Telephone Service –** ***Not Applicable.***

   a. **Cable TV Service –** ***Not Applicable.***

1.3 COORDINATION & INTERACTION WITH SITE AND OCCUPANTS

A. Owner Occupancy: The Owner WILL occupy the existing building, the adjacent Control Simulation Unit Building, and asphalt parking area for the duration of the construction period.

1. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits without impeding egress, unless otherwise indicated. Renovation work within the existing building may be scheduled outside normal work hours, in order to prevent interruptions to the Owners operations.

2. Workers shall not have contact with, or otherwise interact with occupants. Issues involving in appropriate contact or interaction with occupants, at the sole discretion of the Owner, may result in immediate removal from the project site, and contact of Police or other authorities, as is appropriate.

3. Provide temporary barricades as required by the Owner to maintain the safety of occupants, and the general public.

   a. **Where indicated in the Contract Documents, or as otherwise, directed by the Owner, provide rigid barricades, typically 6' high chain link fencing with ground-set posts, and continuous top and bottom tension wires or rails, as is required for the application.**

      Panel-type systems may be utilized in certain applications, across existing paving, and where debris screen is not required.

   b. **At locations where occupants will be in close proximity to the work, provide opaque mesh screening, to protect occupants from debris, and to visually separate occupants and workers.**

   c. **Flexible orange safety fencing may be used for material storage areas, or to direct vehicular or automobile traffic, or as a perimeter barricade around trees and/or other areas that are off limits to construction traffic.**

   d. **Flexible orange safety fencing is not acceptable for separation of occupants from work areas.**

   e. **No work shall commence on the site, until temporary barricades have been installed, inspected, and approved by the Owner.**

f. **The Owner reserves the right to stop the work at any time that barricades have been removed or damaged, as necessary to protect the safety of the students, employees, or visitors.**

g. **No additional compensation will be made to the Contractor for work stoppages resulting from safety-related issues caused by the Contractor or his Subcontractors.**

4. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct doors, corridors, walkways, or other occupied or used facilities without written permission from Owner and the Authorities Having Jurisdiction.

5. Notify the Owner not less than 1 week in advance of activities that will affect Owner's operations including but not limited to: water, power, sewer, gas, climate control, telephone, data, access, etc.

6. Contractor shall provide a safe and secure construction site and areas adjacent to construction, providing all necessary protections for visitors and the general public. Temporary fencing may be required over and above that which may be indicated on the Drawings.

7. Exercise care when working around existing trees. Provide protection for existing trees to remain. Store materials away from trees and tree roots.

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances, as listed in Section 3.3 - "SCHEDULE OF ALLOWANCES", below:

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date(s) when final selection and purchase of any product(s) and/or system(s) described by an allowance must be completed, in order to avoid delays to the Work.

B. At the Architect's request, obtain multiple proposals for each item to be included provided for by use of the allowance.

C. Purchase and install products and/or systems selected by Architect from the designated and approved supplier(s).

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the format and with supporting documentation, as required by the Owner for all Change Order Requests.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for items related to allowances in the same manner as required for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 LUMP-SUM, UNIT-COST, AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 **ADMINISTRATIVE PROCEDURES FOR ALLOWANCES**

A. **The amount of the Allowance is to be included in the Contractor's Bid Amount, in such a way that the total amount of the Allowance is incorporated PRIOR to the application of the Contractor's Overhead and Profit, Insurances, Bonds, Permits, Fees, Supervision, field expenses, and other related costs.**

B. **The Contractor's Overhead and Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, and other related costs associated with the work to be applied to the Allowance are to be included in the Original Contract Sum, but are not part of the Allowance.**

C. **Change Orders to be applied to the Allowance will include only the actual Materials, Sales and Use Taxes (if applicable), Labor, Labor Taxes, and Equipment Rental costs directly associated with the work being applied to the Allowance. No Overhead, Profit, Insurance, Bonds, Permits, Fees, Supervision, field expenses, or other similar costs will be applied to the Allowance.**

D. **Each Allowance shall be listed as a separate line item on the Contractor's Application for Payment.**

E. **Allowances shall be used only as directed by the Architect, after approval by the Owner. Amounts to be charged to the Allowance shall be applied only upon receipt and approval of a formal written Change Order Request detailing the Change, along with all required supporting information.**

F. **At Project closeout, any unused amounts remaining in the Allowance will be credited to the Owner by a formal, written Change Order.**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. **<u>UNIT PRICE ALLOWANCE NO.1</u> – Furnish and Install Additional Excavation & Lime-Treated Structural Fill, Placed and Compacted, including all Materials, Labor, Equipment, Transportation, Profit, Bonds, Insurances, etc.**

Quantity / Unit Of Measure: 400 Cubic Yards

<u>This Unit Price Allowance shall be equal to the Unit Price Extension included on the Unit Price Form, and shall be included in the Contractor's Bid as UNIT PRICE ALLOWANCE NO.1.</u>

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. <u>Alternate No. 1</u> – Interior Renovation of (1) Existing Classroom to become a new Process Control Simulation Lab, indicated and scheduled in the Drawings as Alternate No.1

B. <u>Alternate No. 2</u> - Interior Renovation of the existing Faculty Area and (1) Existing Classroom to create a new Conference Room, Faculty Work Room, Faculty Restrooms, and additional Faculty Offices, indicated and scheduled in the Drawings as Alternate No.2.

C. <u>Alternate No.3</u> – Construction of a New Dumpster Yard and Drive, indicated and scheduled in the Drawings as Alternate No.3.

END OF SECTION 012300

SECTION 012400 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

C. Extended Unit Prices shall be included as an allowance within the Bid Price for the portion of work they are associated with. Reference Section 012100 Allowances.

PART 2 - EXECUTION

2.1 LIST OF UNIT PRICES

Reference the Louisiana Uniform Public Works Bid Form & Unit Price Form, included in the Project Manual.

Unit Price No.1 - (ADD or DEDUCT) Furnish and Install Additional Excavation & Lime-Treated Structural Fill, Placed and Compacted, including all Materials, Labor, Equipment, Transportation, Profit, Bonds, Insurances, etc. Actual / final quantity shall be verified and documented in the field. Quantity of excavation and fill shall be measured and calculated based on In-Place / Open Hole measurements. Truck measurement(s) shall not be utilized.

Quantity / Unit Of Measure: 300 Cubic Yards, as indicated on the Unit Price Form.

The Unit Price Allowance shall be equal to the Unit Price Extension included on the Unit Price Form, and shall be included in the Contractor's Bid as UNIT PRICE ALLOWANCE NO.1.

END OF SECTION 012400

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

B. See Division 1 Section 012100 "Allowances" for procedural and administrative requirements for handling and processing allowances.

C. See Division 1 Section 012300 "Alternates and Unit Prices" for procedural and administrative requirements for using unit prices.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, which do not involve an adjustment to the Contract Sum or the Contract Time.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect 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. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within the time period specified in the Proposal Request, 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.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and detailing the effect that the change will have on the Work.

   a. Provide a complete description of the proposed change.
   b. Indicate the effect of the proposed change on both 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 detailed breakdown of 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 Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Submit claims for increased costs related to a change in scope or nature of the unit price or allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within **21** days of receipt of the Change Order Request or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than **21** days after such authorization.

1. Do not include any Contractor's or Subcontractor's indirect expense in the Change Order cost, amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

2. No change to the Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.4 UNIT PRICES

A. Unit Price Adjustment: To adjust the Contract Amount based on unit price quantities, base each Change Order proposal on the difference between the estimated quantity provided as part of the Contract Documents and the actual documented quantity of work in-place, multiplied by the unit price amount.

1. All Overhead, Profit, Bonds, Insurances, Permits, Fees, Supervision, and other related costs are to be included in the Unit Cost.

2. Submit substantiation of any time impact to the Contract Duration due to the change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
3. The Owner reserves the right to verify the quantity of work-in-place by independent quantity survey, measure, or count.

1.5 ALLOWANCES

A. Allowance Adjustment: To allowance amounts, base each Change Order proposal on the difference between the per-unit purchase price amount and the allowance, multiplied by the final measurement or quantity of work-in-place.

1. Include installation costs in the purchase price amount only where indicated as part of the allowance.
2. If requested, prepare an explanation and supporting documentation to substantiate the distribution of additional labor, equipment, profit, overhead, bonds, insurances, permits, fees, or other related costs claimed on the difference between the original allowance amount or quantity provided in the Contract Documents and the actual amount or quantity of work-in-place.

3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. The Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701, or the Owner's standard Change Order Form, if applicable.

1.7 FIELD ORDER

A. Field Order: The Architect may issue a Field Order on the Owner's standard form, if applicable.

1. The Field Order is a directive to the Contractor for changes to the Work which, if not implemented expeditiously, might cause delays to the project, or result in damage or harm to property or individuals, and where the Owner and Contractor have not yet come to an agreement on changes in the Contract Sum or Contract Time. Upon receipt of a Field Order, the contractor shall promptly proceed with the change in the Work described therein.

2. The Field Order shall instruct the Contractor to proceed immediately with a change in the Work, pending subsequent documentation and inclusion in a formal written Change Order.

3. The Field Order shall contain a description of the nature or scope change in the Work. It will also designate the method to be followed to determine the change in the Contract Sum and/or the Contract Time.

4. The Field Order shall be prepared and issued by the Architect, however, the Field Order shall not be valid without the Owner’s authorization, as indicated by the Owner’s Facility Manager or Project Manager signature on the Field Order.

5. Documentation: Maintain detailed records on a time and material basis of work required by the Field Order.

6. After completion of the work, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
7. Failure to provide thorough, detailed, and complete documentation of the work performed as part of the Field Order will result in the disqualification of the parts of the Contractor's request for compensation in question.

1.8 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: The Architect may issue a Construction Change Directive on AIA Document G714, or the Owner's standard form, if applicable.

1. The Construction Change Directive instructs the Contractor to proceed immediately with a change in the Work, pending subsequent documentation and inclusion in a formal written Change Order.

2. The Construction Change Directive shall contain a description of the nature or scope change in the Work. It will also designate the method to be followed to determine the change in the Contract Sum and/or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
2. Failure to provide thorough, detailed, and complete documentation of the work performed as part of the Construction Change Directive will result in the disqualification of the parts of the Contractor's request for compensation in question.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012610 - WEATHER-RELATED DELAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing modifications to the Contract Time, specifically related to inclement weather and weather-related delays.

1.2 REQUESTS FOR EXTENSION OF CONTRACT TIME DUE TO WEATHER

A. If adverse weather conditions are the basis for a claim for additional time, the Contractor shall document both the weather conditions causing the delay, and that those weather conditions had an adverse effect on the scheduled construction.

B. At the end of each month, the Contractor shall make one claim for any adverse weather days occurring within that month. The claim must be accompanied by sufficient documentation evidencing the adverse days, as well as the direct impact on the scheduled construction. Failure to make such Claim within 14 days of the last day of the month shall prohibit any future claims for adverse days for that month.

C. Contractor-Initiated Requests for Extension of Time due to weather: If inclement weather or weather-related conditions cause a delay to the project, the Contractor may request an Extension of Time by submitting a written request to the Architect. Such request shall comply with all requirements of this Section.

1. Include a statement outlining the nature of the weather delay and detailing the effect that the change will have on the Work.

    a. Provide a description of the weather delay for each day claimed.
    b. Indicate the effect of the weather delay on the work scheduled for each day claimed.
    c. Indicate the effect of the weather delay on the Contract Time.
    d. Provide documentation to substantiate the weather delay.

1. Examples of such documentation may include the following:

    a. Climate/Data Reports issued by the National Weather Service
    b. Copies of the Contractor's Daily Log indicating the weather conditions for each day claimed, the work scheduled for that day, any work performed on site that day, and the portion of the day worked, if any.

2. Include an updated Contractor's Construction Schedule that indicates the effect of the delay, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

D. Claims for lost time due to inclement weather or weather-related conditions, shall be submitted as detailed in Specification Section 012600 "Contract Modification Procedures".

E. **Claims for lost time due to inclement weather shall take into account the Reasonably Anticipated Days of Inclement Weather per month, as stipulated in the Supplementary Conditions, or elsewhere in the Contract Documents.**

1. **Claims for additional time shall clearly indicate the total number of adverse weather or site conditions in the previous month, minus the stipulated number or reasonably anticipated adverse weather days, resulting in the number of days requested for the month.**

2. **Reasonably Anticipated Weather Delays shall be as follows:**

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

F. **Submit claims for lost time due to inclement weather or weather-related conditions to the Architect, on a monthly basis, with pay application for the same time period and no later than the 10th day of the following month.**

G. **Days with inclement weather that do not adversely impact the critical path as indicated on the Contractor's submitted construction schedule shall not be considered as a delay to the project by the Owner.**

H. **The Owner retains the right to reject claims for lost time due to inclement weather or weather-related conditions submitted later than the 10th day of the following month.**

I. **An increase in the Contract Time due to weather-related delays shall not be cause for an increase in the Contract Amount**.

1.3 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Request for Extension of the Contract Time due to Weather-Related Delays, the Architect will prepare and issue a Change Order for the signatures of the Owner and Contractor on AIA Document G701, or the Owner's standard Change Order Form, if applicable.

B. At the Owner's request, or with the Owner's approval, the Architect may approve the Contractor's Request in writing, but delay the issuance of the associated Change Order, pending other outstanding items to be included in the Change Order. Such delay, shall not be considered detrimental to the Contractor.

END OF SECTION 012610

SECTION 012900 – CONTRACT PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for preparation and processing of the Contractor's Certificate and Application(s) For Payment.

1.2 RELATED DOCUMENTS

A. Drawings

B. Project Manual and Specifications

C. General Conditions and Supplementary Conditions (if applicable).

D. Other special instructions or requirements, contained within Division 1.

E. Refer to Division 1 Section 012100 "Allowances" for procedural and administrative requirements for handling and processing allowances.

F. Refer to Division 1 Section 012300 "Alternates and Unit Prices" for procedural and administrative requirements for using unit prices.

G. Refer to Division 1 Section 012600 "Contract Modification Procedures" for procedural and administrative requirements for changes to the Contract Amount and Contract Time.

1.3 DEFINITIONS

A. Contractor's Application for Payment: A standardized form, provided by the Owner and utilized by the Contractor, for requesting payment from the Owner for Work in place, or Materials properly stored on site.

1. The Contractor's Application for Payment shall provide a detailed recap of the Original Contract Sum, any changes to the Contract Amount by Change Orders, the revised Contract Sum to Date, any Materials Stored on Site, the Total Completed and Stored To Date, the Retainage withheld, the Total Earned Less

Retainage, the Previous Payments to the Contractor, the Current Payment Due to the Contractor, and the Balance to Finish Including Retainage.

2. The Application For Payment shall incorporate the Schedule of Values, as the basis for payment of the Work Completed To Date, and Materials Stored On Site, as further described below.

3. Schedule of Values: A detailed listing of the allocation of costs for the various portions or component parts of the project, and totaling the Contract Sum. The Schedule of Values will be used as the basis for reviewing and approving the Contractor's Application for Payment, therefore, the Schedule of Values will include sufficient detail that the Architect can readily review, approve, and substantiate to the Owner that the Contractor's request for payment is generally in line with the Work Completed to Date, as well as the Materials Stored on Site.

1.4 FORMAT FOR PAYMENT REQUESTS

A. The form to be utilized for payment request will be the American Institute of Architects, AIA Form G702 “Application and Certificate For Payment”, and AIA Form G703 “Continuation Sheet”. A copy of the form is attached for reference. NO OTHER FORM WILL BE ACCEPTED.

1. 4 original, signed copies of the Application and Certificate for Payment shall be required each month.

2. All 4 copies of the Application and Certificate for Payment shall be signed and sealed by a Notary Public, duly registered in the State of Louisiana.

3. The original, signed, and notarized copies of the Application and Certificate for Payment shall be delivered to the office of the Architect, no later than the last day of the month, for which the Contractor is requesting payment. Within 7 days, the Architect will review and either:

   a. Certify the request for payment, and forward to the Owner with his recommendation to process and pay the request.
   b. Notify the Contractor of questions or concerns which will require revision or additional information, prior to making a recommendation to the Owner.

B. The Continuation Sheet shall contain a detailed breakdown of the costs associated with the project, by Specification Section, and/or portion of the work, in order to allow for a detailed review and approval of the materials and labor that the Contractor is requesting payment for. BREAKDOWN BY SPECIFICATION DIVISON WILL NOT BE ACCEPTED.

1. Refer to the (2) attached sample Application and Certificate for Payment with Continuation Worksheets, for reference. Specific line items may be modified as is applicable to the project.

1.5 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 Forms: Unless the Owner requires a proprietary standardized form of Application For Payment, AIA Document G702 "Application And Certificate For Payment" shall be utilized, with AIA Document G703 "Application For Payment - Continuation Sheet" attached to include the items contained within the Schedule of Values.

D. 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 and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit three (6) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours.

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

F. 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. Copies of building permits, where applicable.

G. Application for Payment at Substantial Completion: After issuing 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 designed portions of the Work.

H. Final Payment Application: 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. Updated final statement, accounting for final changes to the Contract Sum.
3. Evidence that claims have been settled (No-lien certificate).
4. Final, liquidated damages settlement statement.

1.5 SCHEDULE OF VALUES

A. Coordination: **Submit the Schedule of Values to the Architect for review and approval, at the earliest possible date, but in no case later than 14 days prior to preparing and submitting the first Application for Payment**.

1. No Application for Payment will be reviewed or processed by the Architect, prior to approval of the Contractor's proposed Schedule of Values.

2. Refer to the attached Sample Schedule(s) of Values for representative examples and level of detailed breakdown that shall be considered acceptable.

3. As required by the Insurance Company, the Schedule of Values shall provide a separate breakdown for each Building Area, as noted and indicated on the Drawings and Key Plan, with the appropriate division of costs for each area by Specification Section and Item. The Contractor and all Subcontractors and Material Suppliers shall endeavor to provide an accurate breakdown of costs for each.

B. Format: Unless the Owner requires a proprietary standardized form of Application For Payment, AIA Document G702 "Application And Certificate For Payment" shall be utilized, with AIA Document G703 "Application For Payment - Continuation Sheet" attached to include the items contained within the Schedule of Values.

C. Content:

1. Arrange the Schedule of Values in tabular form, with separate columns to include the following:

    a. Item Number
    b. Description of Work
    c. Value
    d. Work Completed From Previous Application
    e. Work Completed This Period
    f. Materials Presently Stored
    g. Total Completed and Stored To Date
    h. Percentage Complete
    i. Balance To Finish
    j. Retainage

2. Provide breakdown of the Contract Sum in sufficient detail to facilitate initial and ongoing evaluation, review, and approval of the Contractor's Application For Payment, relative to the progress observed at the project site.

3. The Schedule of Values shall include a minimum of one line item for each Specification, Section, Item, Product Category, or Trade, however, large or complex trades or areas of work, or subcontract work incorporating second-tier subcontractors shall be broken-down into multiple sub-categories, in order to facilitate review and approval.

For example:	Metal Stud Framing	$$$$$
	Sheetrock & Accessories	$$$$$
	Firestopping	$$$$$
	Acoustical Ceilings	$$$$$
	Plumbing - Rough-In	$$$$$
	Plumbing - Top-Out	$$$$$
	Plumbing - Equipment	$$$$$
	Plumbing - Fixtures	$$$$$
	Electrical - Below Grade	$$$$$
	Electrical - Above Grade	$$$$$
	Electrical - Site	$$$$$
	Electrical - Gear & Equipment	$$$$$

Electrical - Fixtures	$$$$$
Electrical - Fire Alarm	$$$$$
Electrical - Security System	$$$$$

4. Round line item values to the nearest whole dollar, the total of which shall equal the original or revised (if applicable) Contract Sum.

5. Stored materials shall be indicated for each line item, in the appropriate column, until incorporated into the work.

    a. Differentiate between items stored on-site and items stored off-site, if allowable by the Owner.
    b. Include evidence to substantiate the value of such items, such as invoices, as is appropriate.
    c. Include evidence to substantiate that items stored off-site are insured or stored in a bonded warehouse, if allowable by the Owner.

6. Temporary facilities, utilities, security measures, and similar cost items that are not directly incorporated into the Work may be shown either as separate line items, or included together as General Conditions, at the Contractor's option.

7. Upon issuance of a Change Order by the Architect, and execution by all parties, the work contained within the Change Order shall be added to the Contract Sum, as well as the Schedule of Values, with the heading "Change Order No. #" with an associated dollar value of $0.00. The heading "Change Order No. #" shall be accompanied by a listing of the individual items comprising the Change Order as separate line items, with the appropriate associated value for each.

8. Individual items contained within each Change Order shall be billed separately.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

AIA® Document G703™ – 1992

To: [redacted] From Contractor: [redacted]

Continuation Sheet

AIA Document G702™, Application and Certification for Payment, containing Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Project: [redacted]

APPLICATION NO: 3 Page 2 of 5
APPLICATION DATE: 1/17/2011
PERIOD TO: 12/31/2010
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (Not in D or E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (If variable rate)
1.	BOND	54,350.00	0.00	54,350.00	0.00	54,350.00	100	0.00	2,717.50
2	INSURANCE	44,710.00	0.00	44,710.00	0.00	44,710.00	100	0.00	2,235.50
3	PERMITS	9,810.00	0.00	9,810.00	0.00	9,810.00	100	0.00	490.50
4	GENERAL CONDITIONS	467,000.00	90,400.00	49,700.00	0.00	140,100.00	30	326,900.00	7,005.00
5	SURVEYOR	10,000.00	5,000.00	2,000.00	0.00	7,000.00	70	3,000.00	350.00
6.	SITEWORK	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
7	- Clearing, Excv., Fill, Grade	400,000.00	280,260.00	23,540.00	0.00	303,800.00	76	96,200.00	15,190.00
8	- Storm Drainage, Catch Basins	221,000.00	79,700.00	97,100.00	0.00	176,800.00	80	44,200.00	8,840.00
9	- Geo-Tex Fabric & Limestone	295,000.00	0.00	88,500.00	0.00	88,500.00	30	206,500.00	4,425.00
10	- Silt, Fencing, Etc.	10,000.00	5,000.00	2,000.00	0.00	7,000.00	70	3,000.00	350.00
11	TEMPORARY SITE FENCING	12,000.00	0.00	3,000.00	0.00	3,000.00	25	9,000.00	150.00
12	WOOD FENCING	8,900.00	0.00	0.00	0.00	0.00	0	8,900.00	0.00
13	HYDROSEEDING	6,000.00	0.00	0.00	0.00	0.00	0	6,000.00	0.00
14	TERMITE TREATMENT	2,000.00	0.00	2,000.00	0.00	2,000.00	100	0.00	100.00
15	CONCRETE	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
16	- Drilled Shafts	30,050.00	30,050.00	0.00	0.00	30,050.00	100	0.00	1,502.50
17	- Church Bldg. Found. & Slab	203,900.00	47,202.00	150,581.00	0.00	197,783.00	97	6,117.00	9,889.15
18	- Mezzanines, Towers	10,800.00	0.00	0.00	500.00	500.00	5	10,300.00	25.00
19	- Plaza, Walks, Site, Misc.	131,700.00	0.00	0.00	4,869.00	4,869.00	4	126,831.00	243.45
20	- Chiller Yard	47,200.00	0.00	0.00	0.00	0.00	0	47,200.00	0.00
21	DECORATIVE BOLLARDS	9,100.00	0.00	0.00	0.00	0.00	0	9,100.00	0.00
22	STRUC. STEEL, BAR JOIST, DECK	683,261.00	37,224.00	0.00	0.00	37,224.00	5	646,037.00	1,861.20
23	DRYWALL & ACOUSTICAL	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
24	- Metal Stud Framing	396,460.00	0.00	0.00	0.00	0.00	0	396,460.00	0.00
25	- Sheetrock/Sheathing	100,480.00	0.00	0.00	0.00	0.00	0	100,480.00	0.00
	GRAND TOTAL	3,153,721.00	574,836.00	527,291.00	5,369.00	1,107,496.00	35	2,046,225.00	55,374.80

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To: [redacted] From Contractor: [redacted]

Continuation Sheet

AIA Document G702™, Application and Certification for Payment, containing Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Project: [redacted]

APPLICATION NO: 3 Page 3 of 5
APPLICATION DATE: 1/17/2011
PERIOD TO: 12/31/2010
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (Not in D or E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C − G)	RETAINAGE (If variable rate)
26	- Insulation	23,650.00	0.00	0.00	0.00	0.00	0	23,650.00	0.00
27	- Misc. Framing/Blocking	18,370.00	0.00	0.00	0.00	0.00	0	18,370.00	0.00
28	- Acoustical Ceilings	12,450.00	0.00	0.00	0.00	0.00	0	12,450.00	0.00
29	PLASTER/STUCCO	157,420.00	0.00	0.00	0.00	0.00	0	157,420.00	0.00
30	WATERPROOFING	95,000.00	0.00	0.00	0.00	0.00	0	95,000.00	0.00
31	ROUGH CARPENTRY	24,620.00	0.00	0.00	0.00	0.00	0	24,620.00	0.00
32	ROOFING	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
33	- Metal Roofing & Trims	67,900.00	0.00	0.00	0.00	0.00	0	67,900.00	0.00
34	- Built Up Roofing & Sht.Metal	39,000.00	0.00	0.00	0.00	0.00	0	39,000.00	0.00
35	- Roofing Hatches & Curbs	2,200.00	0.00	0.00	0.00	0.00	0	2,200.00	0.00
36	- Roof Insulation,Peel & Stick	40,100.00	0.00	0.00	0.00	0.00	0	40,100.00	0.00
37	PRE-FAB DOME UNITS	23,200.00	0.00	0.00	0.00	0.00	0	23,200.00	0.00
38	CAST STONE	348,650.00	0.00	0.00	0.00	0.00	0	348,650.00	0.00
39	GLASS & GLAZING	147,800.00	0.00	0.00	0.00	0.00	0	147,800.00	0.00
40	PAINTING	58,550.00	0.00	0.00	0.00	0.00	0	58,550.00	0.00
41	SONOSPRAY	38,400.00	0.00	0.00	0.00	0.00	0	38,400.00	0.00
42	FLOORING	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
43	-Porcelain Tile	145,200.00	0.00	0.00	0.00	0.00	0	145,200.00	0.00
44	-VCT	1,600.00	0.00	0.00	0.00	0.00	0	1,600.00	0.00
45	-Stone Tile	62,000.00	0.00	0.00	0.00	0.00	0	62,000.00	0.00
46	GRANITE TOPS	9,770.00	0.00	0.00	0.00	0.00	0	9,770.00	0.00
47	MILLWORK	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
48	-Wood Trim	149,700.00	0.00	0.00	0.00	0.00	0	149,700.00	0.00
49	-Cabinets	45,000.00	0.00	0.00	0.00	0.00	0	45,000.00	0.00
50	-Wood Doors & Frames	74,000.00	0.00	0.00	0.00	0.00	0	74,000.00	0.00
	GRAND TOTAL	4,738,301.00	574,836.00	527,291.00	5,369.00	1,107,496.00	23	3,630,805.00	55,374.80

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To: [redacted] From Contractor:

Continuation Sheet

AIA Document G702™, Application and Certification for Payment, containing Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Project: [redacted]

APPLICATION NO: 3 Page 4 of 5
APPLICATION DATE: 1/17/2011
PERIOD TO: 12/31/2010
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED: FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED: THIS PERIOD	MATERIALS PRESENTLY STORED (Not in D or E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C − G)	RETAINAGE (If variable rate)
51	HOLLOW METAL	2,490.00	0.00	0.00	0.00	0.00	0	2,490.00	0.00
52	FINISH HARDWARE	47,300.00	0.00	0.00	0.00	0.00	0	47,300.00	0.00
53	TOILET PARTITIONS	3,090.00	0.00	0.00	0.00	0.00	0	3,090.00	0.00
54	TOILET ACCESSORIES	5,780.00	0.00	0.00	0.00	0.00	0	5,780.00	0.00
55	FIRE EXT., CABS., DEF. CAB:	2,010.00	0.00	0.00	0.00	0.00	0	2,010.00	0.00
56	SIGNAGE	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
57	-Interior Room/Exit Signs	4,080.00	0.00	0.00	0.00	0.00	0	4,080.00	0.00
58	-Parking Signage	1,680.00	0.00	0.00	0.00	0.00	0	1,680.00	0.00
59	CURTAIN TRACKS	640.00	0.00	0.00	0.00	0.00	0	640.00	0.00
60	DECORATIVE GRILLES	4,900.00	0.00	0.00	0.00	0.00	0	4,900.00	0.00
61	BIRD SCREENS & TOWERS	7,950.00	0.00	0.00	0.00	0.00	0	7,950.00	0.00
62	INSTALL OWNER FURNISHED ITEMS	9,000.00	0.00	0.00	0.00	0.00	0	9,000.00	0.00
63	PLUMBING	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
64	-Site Util/Sewer, Water, Fire	150,400.00	76,456.00	36,344.00	0.00	112,800.00	75	37,600.00	5,640.00
65	-Church Bldg. - Rough In Slab	19,300.00	0.00	19,300.00	0.00	19,300.00	100	0.00	965.00
66	-Church Bldg. - T.O.	34,800.00	0.00	0.00	0.00	0.00	0	34,800.00	0.00
67	-Church Bldg. - Fixtures	23,200.00	0.00	0.00	0.00	0.00	0	23,200.00	0.00
68	SPRINKLER	49,900.00	0.00	0.00	0.00	0.00	0	49,900.00	0.00
69	HVAC	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
70	-Piping, Pumps, Etc.	149,500.00	0.00	0.00	0.00	0.00	0	149,500.00	0.00
71	-Equipment	155,000.00	0.00	0.00	0.00	0.00	0	155,000.00	0.00
72	-Ducts & Grilles	144,000.00	0.00	0.00	0.00	0.00	0	144,000.00	0.00
73	-Insulation	55,000.00	0.00	0.00	0.00	0.00	0	55,000.00	0.00
74	-Controls	65,000.00	0.00	0.00	0.00	0.00	0	65,000.00	0.00
75	Air/Water Balance	20,500.00	0.00	0.00	0.00	0.00	0	20,500.00	0.00
	GRAND TOTAL	5,693,821.00	651,292.00	582,935.00	5,369.00	1,239,596.00	22	4,454,225.00	61,979.60

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To: [redacted] From Contractor: [redacted] C.

Continuation Sheet

AIA Document G702™, Application and Certification for Payment, containing Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

Project: [redacted]

APPLICATION NO: 3 Page 5 of 5
APPLICATION DATE: 1/17/2011
PERIOD TO: 12/31/2010
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (Not in D or E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C − G)	RETAINAGE (If variable rate)
76	ELECTRICAL	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
77	-Electrical Service	12,000.00	0.00	7,000.00	0.00	7,000.00	58	5,000.00	350.00
78	-Site Electrical	18,000.00	0.00	8,000.00	0.00	8,000.00	44	10,000.00	400.00
79	-Gear & Distribution	47,000.00	0.00	0.00	0.00	0.00	0	47,000.00	0.00
80	-Rough In - Church Slab/Walls	122,000.00	0.00	10,000.00	0.00	10,000.00	8	112,000.00	500.00
81	-Trim Out	39,800.00	0.00	0.00	0.00	0.00	0	39,800.00	0.00
82	-Fixtures	365,400.00	0.00	0.00	0.00	0.00	0	365,400.00	0.00
83	Fire Alarm	35,000.00	0.00	0.00	0.00	0.00	0	35,000.00	0.00
84	-Lighting Protection	12,600.00	0.00	0.00	0.00	0.00	0	12,600.00	0.00
85	CONTINGENCY ALLOWANCE	150,000.00	0.00	0.00	0.00	0.00	0	150,000.00	0.00
86	CHANGE ORDER NO. 1 (Pending)	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
87	- Add Sinks @ Restrooms	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
88	- Add Piping @ Ent. Drives	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
89	- Add Irrigation Water Main	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
90	- Deduct Builder's Risk Ins.	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
91	CHANGE ORDER NO. 2 (Pending)	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
92	- Add Conc. Paving/Parking	54,831.00	0.00	0.00	54,831.00	54,831.00	100	0.00	2,741.55
93	- Add Porte Cochere	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
94	- Deduct Builders Risk Ins.	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
	GRAND TOTAL	6,550,452.00	651,292.00	607,935.00	60,200.00	1,319,427.00	20	5,231,025.00	65,971.35

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PAYMENT APPLICATION DETAILS

Customer: [redacted]
Project: [redacted]

Application Number: 3
For Period Ending: 05/31/2014

A	B	C	D	E	F	G		H	I
			Work Completed		Materials	Completed			
Item Number	Description	Scheduled Value	From Previous Application	This Period Value	Presently Stored	and Stored To Date	Total %	Balance To Finish	Retainage Value
01200	Bond	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01292	Building Permit	3,419.00	3419.00	0.00	0.00	3419.00	100.00	0.00	170.95
01300	Supervision	40,400.00	6354.92	3,211.80	0.00	9566.72	23.68	30,833.28	478.34
01316	Layout Survey	2,728.00	2728.00	0.00	0.00	2728.00	100.00	0.00	136.40
01319	Mobilization	330.00	330.00	0.00	0.00	330.00	100.00	0.00	16.51
01422	Builder Risk	4,946.00	1119.28	321.00	0.00	1440.28	29.12	3,505.72	72.01
01424	OCP Policy	824.00	824.00	0.00	0.00	824.00	100.00	0.00	41.20
01426	Dumpster	1,649.00	373.99	363.94	0.00	737.93	44.75	911.07	36.90
01430	General Cleanup	2,688.00	0.00	285.47	0.00	285.47	10.62	2,402.53	14.27
01440	Final Cleanup	967.00	0.00	0.00	0.00	0.00	0.00	967.00	0.00
01500	Project Sign	915.00	0.00	915.00	0.00	915.00	100.00	0.00	45.75
01510	Temporary Utilities	3,023.00	0.00	520.00	0.00	520.00	17.20	2,503.00	26.00
01522	Field Offices & Sheds	880.00	0.00	0.00	0.00	0.00	0.00	880.00	0.00
01542	Construction Equipment	2,060.00	1564.57	0.00	0.00	1564.57	75.95	495.43	78.23
01560	Temporary Barriers	566.00	566.00	0.00	0.00	566.00	100.00	0.00	28.30
01800	Fuel/Travel	4,617.00	444.16	310.72	0.00	754.88	16.35	3,862.12	37.75
01910	Allowances	27,479.00	0.00	0.00	0.00	0.00	0.00	27,479.00	0.00

PAYMENT APPLICATION DETAILS

Customer: [redacted]
Project: [redacted]

Application Number: 3
For Period Ending: 05/31/2014

A	B	C	D	E	F	G		H	I
			Work Completed		Materials Presently Stored	Completed and Stored To Date	Total %	Balance To Finish	Retainage Value
Item Number	Description	Scheduled Value	From Previous Application	This Period Value					
02300	Earthwork	68,100.00	56305.08	7,470.57	0.00	63775.65	93.65	4,324.35	3,188.78
02752	Pavement Concrete	34,723.00	0.00	0.00	0.00	0.00	0.00	34,723.00	0.00
02755	Paving Forms & Accessories	3,828.00	0.00	0.00	0.00	0.00	0.00	3,828.00	0.00
02760	Paving Labor & Equipment	3,070.00	0.00	0.00	0.00	0.00	0.00	3,070.00	0.00
02770	Joint Sealents	4,961.00	0.00	0.00	0.00	0.00	0.00	4,961.00	0.00
02785	Paving Striping	274.00	0.00	0.00	0.00	0.00	0.00	274.00	0.00
02800	Trench Drains	358.00	0.00	0.00	0.00	0.00	0.00	358.00	0.00
02820	Fences & Gates	1,600.00	0.00	0.00	0.00	0.00	0.00	1,600.00	0.00
02840	Concrete Parking Bumpers	2,215.00	0.00	0.00	0.00	0.00	0.00	2,215.00	0.00
02890	Handicap Signs	300.00	0.00	0.00	0.00	0.00	0.00	300.00	0.00
02920	Landscaping	1,560.00	0.00	0.00	0.00	0.00	0.00	1,560.00	0.00
02955	Pipe Bollards	4,465.00	0.00	3,376.88	0.00	3376.88	75.63	1,088.12	168.84
03050	Drilled Shafts	15,220.00	15220.00	0.00	0.00	15220.00	100.00	0.00	761.00
03100	Foundation Forming Materials	3,180.00	3180.00	0.00	0.00	3180.00	100.00	0.00	159.00
03110	Foundation Labor & Equipment	56,056.00	23470.65	32,585.35	0.00	56056.00	100.00	0.00	2,802.80
03200	Concrete Reinforcement	20,960.00	13781.20	7,178.80	0.00	20960.00	100.00	0.00	1,048.00
03300	Foundation Concrete	25,970.00	25970.00	0.00	0.00	25970.00	100.00	0.00	1,298.50

PAYMENT APPLICATION DETAILS

Customer: [redacted]
Project: [redacted]

Application Number: 3
For Period Ending: 05/31/2014

A	B	C	D	E	F	G		H	I
			Work Completed		Materials	Completed			
Item Number	Description	Scheduled Value	From Previous Application	This Period Value	Presently Stored	and Stored To Date	Total %	Balance To Finish	Retainage Value
03310	Concrete Pumping	3,070.00	3070.00	0.00	0.00	3070.00	100.00	0.00	153.50
03540	Termite Treatment	420.00	420.00	0.00	0.00	420.00	100.00	0.00	21.00
03700	Rub Concrete	9,150.00	0.00	0.00	0.00	0.00	0.00	9,150.00	0.00
04200	Masonry Units	14,790.00	0.00	0.00	0.00	0.00	0.00	14,790.00	0.00
04410	Masonry Lintels	955.00	0.00	0.00	0.00	0.00	0.00	955.00	0.00
04500	Block Fill	1,000.00	0.00	0.00	0.00	0.00	0.00	1,000.00	0.00
04720	Cast Stone	12,800.00	0.00	0.00	0.00	0.00	0.00	12,800.00	0.00
04800	Masonry Accessories	3,950.00	0.00	0.00	0.00	0.00	0.00	3,950.00	0.00
04810	Mortar & Sand	4,140.00	0.00	0.00	0.00	0.00	0.00	4,140.00	0.00
04850	Masonry Caulking	615.00	0.00	0.00	0.00	0.00	0.00	615.00	0.00
04920	Masonry Labor	30,000.00	0.00	0.00	0.00	0.00	0.00	30,000.00	0.00
05090	Anchor Bolts	3,150.00	3150.00	0.00	0.00	3150.00	100.00	0.00	157.50
06100	Rough Carpentry Materials	52,150.00	35628.88	16,521.12	0.00	52150.00	100.00	0.00	2,607.50
06110	Rough Carpentry Labor	45,200.00	4949.40	22,554.80	0.00	27504.20	60.85	17,695.80	1,375.21
06220	Millwork	77,870.00	0.00	0.00	0.00	0.00	0.00	77,870.00	0.00
06415	Countertops	6,120.00	0.00	0.00	0.00	0.00	0.00	6,120.00	0.00
07210	Building Insulation	9,420.00	0.00	0.00	0.00	0.00	0.00	9,420.00	0.00

PAYMENT APPLICATION DETAILS

Customer: [redacted]
Project: [redacted]

Application Number: 3
For Period Ending: 05/31/2014

A	B	C	D	E	F	G		H	I
			Work Completed		Materials Presently Stored	Completed and Stored To Date	Total %	Balance To Finish	Retainage Value
Item Number	Description	Scheduled Value	From Previous Application	This Period Value					
07260	Vapor Retarders	5,114.00	0.00	0.00	0.00	0.00	0.00	5,114.00	0.00
07310	Roofing	35,600.00	0.00	0.00	0.00	0.00	0.00	35,600.00	0.00
07460	Siding	8,400.00	0.00	0.00	0.00	0.00	0.00	8,400.00	0.00
07840	Firestopping	5,000.00	0.00	0.00	0.00	0.00	0.00	5,000.00	0.00
07900	Joint Sealers	1,550.00	0.00	0.00	0.00	0.00	0.00	1,550.00	0.00
08100	Metal Doors & Frames	15,750.00	0.00	0.00	0.00	0.00	0.00	15,750.00	0.00
08210	Wood Doors	11,420.00	0.00	0.00	0.00	0.00	0.00	11,420.00	0.00
08310	Access Doors & Panels	4,600.00	0.00	0.00	0.00	0.00	0.00	4,600.00	0.00
08500	Windows	15,800.00	0.00	0.00	0.00	0.00	0.00	15,800.00	0.00
08700	Hardware	9,700.00	0.00	0.00	0.00	0.00	0.00	9,700.00	0.00
09100	Drywall	58,650.00	0.00	0.00	0.00	0.00	0.00	58,650.00	0.00
09130	Acoustical Suspended Ceiling	15,935.00	0.00	0.00	0.00	0.00	0.00	15,935.00	0.00
09600	Flooring	27,121.00	0.00	0.00	0.00	0.00	0.00	27,121.00	0.00
10100	Visual Display Boards	700.00	0.00	0.00	0.00	0.00	0.00	700.00	0.00
10260	Wall & Corner Guards	1,710.00	0.00	0.00	0.00	0.00	0.00	1,710.00	0.00
10400	Signs	6,100.00	0.00	0.00	0.00	0.00	0.00	6,100.00	0.00
10420	Plaques	3,670.00	0.00	0.00	0.00	0.00	0.00	3,670.00	0.00

PAYMENT APPLICATION DETAILS

Customer: [redacted]
Project: [redacted]

Application Number: 2
For Period Ending: 04/30/2014

A	B	C	D	E	F	G		H	I
			Work Completed		Materials	Completed			
Item Number	Description	Scheduled Value	From Previous Application	This Period Value	Presently Stored	and Stored To Date	Total %	Balance To Finish	Retainage Value
10520	Fire Protection Specialties	1,000.00	0.00	0.00	0.00	0.00	0.00	1,000.00	0.00
10810	Toilet Accessories	10,500.00	0.00	0.00	0.00	0.00	0.00	10,500.00	0.00
11400	Food Service Equipment	4,500.00	0.00	0.00	0.00	0.00	0.00	4,500.00	0.00
15400	Plumbing	108,790.00	0.00	27,325.40	0.00	27325.40	25.12	81,464.60	1,366.27
15700	Heating, Ventilating & Air Conditioning	93,000.00	0.00	0.00	0.00	0.00	0.00	93,000.00	0.00
16500	Electrical	173,650.00	0.00	9,099.26	0.00	9099.26	5.24	164,550.74	454.96
	TOTAL:	1,237,391.00	76,107.95	163,185.84	0.00	239293.79	19.34	998,097.21	11,964.69

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

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

1. Coordination
2. Project meetings
3. Submittals
4. Postings

1.2 COORDINATION

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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. 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. Pre-Construction and Pre-Installation conferences.
7. Project closeout activities

1.3 PROJECT MEETINGS

A. General: 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: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Pre-Construction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 7 days after execution of the Agreement. Hold the conference at Project site.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Utilize Agenda provided by the **Calcasieu Parish School Board**, if applicable.

Additional items of discussion will include items of significance that could affect progress, including, but not limited to 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 requests for information. (RFIs).
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Submittal procedures.
j. Work restrictions.
k. Owner's occupancy requirements.
l. Responsibility for temporary facilities and controls.

m. Parking availability.
n. Office, work, and storage areas.
o. Equipment deliveries and priorities.
p. Security.
q. Labor compliance for state building repairs.

3. Minutes: Architect will record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at weekly intervals on a day and time to be determined, unless otherwise scheduled by the Architect. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner 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 conference 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. Work hours.
10. Hazards and risks.
11. Progress cleaning.
12. Quality and work standards.
13. Status of correction of deficient items.

14. Field observations.
15. Requests for interpretations (RFIs).
16. Status of proposal requests.
17. Pending changes.
18. Status of Change Orders.
19. Pending claims and disputes.
20. Documentation of information for payment requests.

3. Minutes: Contractor will be responsible for will recording and distributing the meeting minutes.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

   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.

1.4 POSTINGS

A. If applicable, the wage decision for the project and/or the Project Wage Rate Determination Sheet shall be posted at the worksite in a prominent location, readily accessible to all employees, for the duration of construction.

B. All posters required by law shall be posted at the jobsite including, but not limited to, the "Federal Minimum Wage", “Notice to All Employees Working on Federal or Federally Financed Construction Projects”, and “Equal Opportunity is the Law.”

Refer to Federal, State, and Local requirements for additional information and/or posters that may be required to be posted.

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This 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. Submittals Schedule.
3. Daily construction reports.
4. Field condition reports.

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 activities are activities on the critical path. They 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.

E. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

F. Major Area: A story of construction, a separate building, or a similar significant construction element.

1.3 SUBMITTALS

A. Submittal Schedule: Submit three copies of the Submittal schedule. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit three opaque copies of initial schedule, large enough to show the entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
2. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
3. Define 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.

C. Daily Construction Reports: Submit three copies at **weekly** intervals.

D. Field Condition Reports: Submit three copies at time of discovery of differing conditions.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

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

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Acceptance.

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

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

1. Activity Duration: Define activities so no activity is longer than **28** 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. List delivery dates of major items of word or pieces of equipment separately, as milestones.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include days required for startup and testing.
5. Acceptance: Indicate completion in advance of date established for Acceptance, and allow time for Architect's administrative procedures necessary for certification of Acceptance.

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 under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. 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.

5. Work Stages: Indicate important stages of construction for each major portion of the Work.
6. Other Constraints, as may be applicable to the Project.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Acceptance, Final Completion, delivery dates of major items and critical pieces of equipment, and other significant dates, as may be applicable to the completion of the Project.

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

2.3 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**. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

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

1. For each construction activity, indicate an estimated completion percentage in percent increments within time bar.
2. Indicate each milestone event with a unique symbol, having a duration of 0 days or 1 day.

3. Indicate at the left side of each activity bar or milestone symbol the Estimated/Actual Start Date.
4. Indicate at the right of each activity bar or milestone symbol the Task Name.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

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

B. Provide a cash requirement prediction (cash flow analysis) based on indicated activities, if required by the Owner.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, 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 **30** 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. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary 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.

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

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal 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.

F. 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.

2.5 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. Equipment at Project site.
3. Material deliveries.
4. High and low temperatures and general weather conditions.
5. Accidents.
6. Stoppages, delays, shortages, and losses.
7. Meter readings and similar recordings.
8. Orders and requests of authorities having jurisdiction.
9. Services connected and disconnected.
10. Equipment or system tests and startups.

B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation, if necessary. 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 no more than **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 Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect 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.

C. **Each month, an updated schedule, reflecting the progress of the Project as of the last day of the Month, shall be included with the Contractor's Request and Application for Payment. The Contractor's Request and Application for Payment will not be reviewed and processed if not accompanied by the required updated Schedule.**

END OF SECTION 013200

SECTION 013231 - PRE-CONSTRUCTION DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

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

1. Pre-Construction photographs and/or video.

B. See Division 1 Section "Closeout Procedures" for submitting digital media as part of Project Record Documentation at Project closeout.

1.2 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. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit electronic copies of each photographic view within **seven** days of taking photographs.

1. Identification: On back of each photo, or as part of electronic documents, provide an applied label or rubber-stamped impression with the following information:

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

2. Digital Images: Submit a complete set of digital image electronic files on CD-ROM. Identify electronic media with date photographs and/or videos were taken. Submit images that have same aspect ratio as the sensor, uncropped.

3. Image Requirements: Provide sufficient photographs and/or video to fully and sufficiently document all existing conditions, including any and all existing damage, which may be necessary to substantiate conditions pre-dating the Contractor's mobilization on-site. Provide temporary lighting, if required, to produce clear, well-lit photographs without obscuring shadows.

1.3 COPIES

A. Provide the Owner, 1 original, unaltered, dated copy for file purposes.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF or JPG format produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than **1600 by 1200** pixels.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION PHOTOGRAPHS AND/OR VIDEO

A. Preconstruction Photographs and/or Video: **Prior to mobilization on site** (before commencement of demolition, excavation or construction operations)] take color digital photographs and/or video of the Project site, existing structures, paving, walks, etc., including all existing items to remain during construction, as well as the surrounding properties, from different vantage points, as directed by the Architect and/or Owner.

1. Flag construction limits before taking construction photographs.
2. Take photographs or video as required to show existing conditions adjacent to property before starting the Work.
3. Take photographs or video of existing buildings or other structures, either on or adjoining the site, to accurately record physical conditions at start of construction.

END OF SECTION 013231

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

B. See Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.

C. See Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.

D. See Division 1 Section "Closeout Procedures" for submitting warranties.

E. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

F. See Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

G. See Division 1 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action.

1. Submittals may be rejected for not complying with requirements of the Specifications and/or Drawings.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittal Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: **Allow no less than 14 days for initial review of each submittal.** The Contractor shall allow additional time if coordination with subsequent submittals is required. Architect will advise the Contractor when a submittal being processed must be delayed for coordination.
2. Preliminary or Intermediate Review: If a preliminary or intermediate submittal is necessary, process it in same manner as for initial submittal.
3. Re-submittal Review: **Allow no less than 21 days for review of each re-submittal.**

D. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

1. Transmittal Form: The Contractor may utilize their standard transmittal form to transmit documents to the Architect. Each set of information submitted shall include a Cover Sheet incorporating the information required in Section 1.3.D.

E. **Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect.** The Architect and his Consultants will retain copies in sufficient quantities for file and distribution. Additional copies may be submitted by the Contractor, Subcontractor, or Suppliers as required for file and field distribution.

F. Identification: Each copy of each submittal shall include a Cover Sheet, providing the following information:

1. **Include the following information on Cover Sheet for processing and recording action taken:**

   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name and address of Contractor.
   e. Name and address of Subcontractor.
   f. Name and address of Supplier.
   g. Name of Product Manufacturer.

   h. Submittal number or other unique identifier, including revision identifier.

      1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01).

      2) Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l. Other necessary identification.

2. **Provide a space approximately 6 by 8 inches on the Cover Sheet to record Contractor's review and approval markings and action taken by Architect.**

G. Deviations: Highlight, encircle, or otherwise clearly note all identify deviations from the Contract Documents on submittals.

H. Items requiring the Architects response: Highlight, encircle, or otherwise clearly note all items requiring specific response from the Architect, such as: Options, Finishes, Color Selections, or other items

I. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

J. Submittal Review:

1. **Submittals received directly from sources other than through the Contractor (i.e. - material supplier or subcontractor), may be returned to the Contractor, without review by the Architect.**
2. **Submittals forwarded to the Architect other than as indicated herein, or without the proper format may be returned to the Contractor, without review by the Architect.**
3. **Submittals forwarded to the Architect which have not been thoroughly reviewed by the Contractor, including all items coordinated and dimensions verified, and with deviations and variations clearly noted, may be returned to the Contractor, without review by the Architect.**

K. 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. Resubmittal of submittals is required until they are marked either "Approved", or "Approved As Noted."
4. **NOTE: Submittals that require review by the Architect more than two (2) times, will be subject to assessment of additional review fees by the Architect. These charges will be assessed at the Architect's standard hourly rate, and shall be at the expense of the Contractor. The Architect shall submit invoice for additional hourly fees to the Owner, and the same will be deducted from the Contractor's payment by the Owner.**

L. 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.

M. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved As Noted" taken by Architect.

N. Field File Copies: Maintain in the Project Field Office a file, organized by specification section, complete with at least one clean copy of all Submittals noted "Approved" or "Approved As Noted", for use by the Architect, Engineers, and Owner. These copies will be in addition to those maintained on the Project site for Field Use.

O. Project Closeout: Clean original copies or photocopies of all submittals will be required to be included in the Operation and Maintenance Manuals, organized by Specification Section, for all items provided for or installed in the Project.

1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. If acceptable to the Architect and/or Engineer, the Contractor or Subcontractor will be required to sign an Electronic Document Release Form prepared by the Architect and/or Engineer, releasing the Architect and/or Engineer from any and all liability, which potentially may arise from the use of the Architect's drawings in the preparation of Shop Drawings, Working Drawings, or other submittals or documents, relating to the project.

2. Should the Contractor or Subcontractor refuse to sign the required document, without condition or exception, the requested files will not be provided for use.

3. Upon executing the document, the Contractor or Subcontractor agrees that the documents provided are for the sole use and benefit of the party requesting the documents, and for use only in association with the performance of this Contract. The documents provided may not be used in association with any other project, duplicated, or provided or distributed to any other party(s), under penalty of law.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

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 printed 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 written recommendations.
b. Manufacturer's product specifications.

c. Manufacturer's installation instructions.
d. Manufacturer's catalog cuts.
e. Wiring diagrams showing factory-installed wiring.
f. Printed performance curves.
g. Operational range diagrams.
h. Compliance with specified referenced standards.
i. Testing by recognized testing agency.

4. **Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect.**

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 of Architect's CAD Drawings is otherwise permitted.

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

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Notation of coordination requirements.
j. Notation of dimensions established by field measurement.
k. Relationship to adjoining construction clearly indicated.
l. Seal and signature of professional engineer if specified.
m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

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 30 by 42 inches (750 by 1000 mm).

3. **Number of Copies: Submit all submittals to the Architect, in electronic (PDF) format. For submittals of large format or requiring physical samples or color samples, the Contractor shall provide up to six (6) original copies, as required by the Architect.**

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 appropriate Specification Section.

3. 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.
4. 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 no less than two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will retain 1 sample set; remainder will be returned.

5. 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: no less than 2 sets of Samples. Architect will retain one Sample sets; remainder will be returned.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.

F. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. 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. Number of Copies: Submit one copy of the subcontractor list, unless otherwise indicated.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit no less than 6 copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized 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.
3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

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

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

F. Installer Certificates: Prepare 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.

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

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

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

J. Material Test Reports: Prepare 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.

K. Product Test Reports: Prepare written reports indicating 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.

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

M. Preconstruction Test Reports: Prepare 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.

N. Compatibility Test Reports: Prepare 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.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

Q. Design Data: Prepare 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.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of product.
2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Construction Photographs and Videotapes: Comply with requirements specified in Division 1 Section "Photographic Documentation" (IF APPLICABLE).

V. Material Safety Data Sheets (MSDS's): Submit information directly to Owner. Do not submit MSDS Sheets to the Architect. Maintain copies of MSDS's on the Project Site throughout the course of Construction, and include the same in the Project Closeout Documentation, Operation and Maintenance Manuals.

1. The Architect's review of Submittal Packages will specifically exclude the review of MSDS's which are included with submittals.

2.3 DELEGATED DESIGN SUBMITTALS

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 Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a Design Certification Letter, 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. Refer to Specification Sections for individual requirements for submittals, drawings, technical data, design calculations, etc. specific to the Delegated-Design Submittal.

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. 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.

B. 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.

C. Submittals forwarded to the Architect without the proper format, and/or which have not been thoroughly reviewed by the Contractor, including all items coordinated and dimensions verified, and with deviations and variations clearly noted, shall be returned to the Contractor, without review by the Architect.

D. NOTE: Submittals that require review by the Architect more than two (2) times, will be subject to assessment of additional review fees by the Architect. These charges will be assessed at the Architect's standard hourly rate, and shall be at the expense of the Contractor. The Architect shall submit invoice for additional hourly fees to the Owner, and the same will be deducted from the Contractor's payment by the Owner.

3.2 ARCHITECT'S ACTION

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

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. "Approved Without Comment", "Approved As Noted", "Revise and Resubmit", "Rejected", or "Returned Without Review".

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

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

END OF SECTION 013300

SECTION 014500 - QUALITY CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Quality Assurance: Requirements for material and product quality and control of installation.

B. Tolerances

C. References and Standards

D. Mock-ups

E. Testing Laboratory Services

F. Inspection Services

G. Manufacturers' field services

1.2 RELATED SECTIONS

A. Section 01 45 23 – Testing and Inspecting Services

B. Section 01 33 00 - Submittal Procedures

C. The Work of this Section shall be included as a part of all Sections of Work, whether referenced therein or not.

1.3 DESCRIPTION OF REQUIREMENTS

A. Unless specifically noted otherwise, perform all Work shown, mentioned, or reasonably inferred and comply with all work restrictions.

B. Many of the requirements specified elsewhere are included herein for reference and convenience. Where a conflict occurs between the CONTRACT Documents, either within themselves or each other, the more stringent requirement or the most expensive combination of materials and workmanship shall prevail.

C. General Contractor shall:

1. Perform Work in accordance with the CONTRACT, as specified herein, and with the quality control requirements of each Design Standards Section;
2. Perform Work in the highest quality workmanship, unless specified otherwise;
3. Join materials with a uniform and accurate fit so they meet with neat straight lines, free of smears, overlaps or irregularities, as applicable to the work;
4. Install all exposed materials appropriately level, plumb, and at accurate angles as shown and flush with adjoining materials;
5. Attach materials with sufficient strength, and with number and spacing of fasteners and attachments that will not fail until materials joined are broken or permanently deformed;
6. Use concealed fasteners, unless shown or directed otherwise.

1.4 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturer's instructions conflict with the DESIGN-STANDARDS, request clarification from Project Manager before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.5 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with CONTRACT Documents, request clarification from Project Manager before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.6 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Owner-GeneralContractor Agreement except where specific date is established by code.

C. Obtain copies of standards where required by product Design Standards sections.

D. When specified reference standards conflict with CONTRACT Documents, request clarification from Project Manager before proceeding.

E. Neither contractual relationships, duties, responsibilities of parties in CONTRACT nor those of Project Manager shall be altered from CONTRACT Documents by mention or inference otherwise in reference documents.

F. Refer to Section 014100, Codes, Regulations and Standards, for additional information concerning applicable reference and standards requirements.

1.7 MOCK-UP REQUIREMENTS

A. Tests will be performed under provisions identified in this section and identified in respective product sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be the comparison standard for remaining Work.

D. Where mock-up has been accepted by Project Manager and is specified in product Design Standards sections to be removed; remove mock-up and clear area when directed to do so by the Project Manager.

E. Mock-up may be approved in phases as portions are completed.

F. Project Mock-up Requirements: Provide an actual sample panel with the following properties:

1. Size: Minimum 6 feet wide by 8 feet tall. Size may vary according to specific project requirements. Brace and support as required to withstand structural windloads.
2. Materials: actual exterior finishes including, but not limited to face brick, cast stone, and plaster, actual building materials and assemblies indicating brick patterns on masonry and stud back-up as occurs with dampproofing and flashing as detailed, actual portion of aluminum storefront indicating jam, sill and head attachment and flashing details, and where appropriate, provide mock-up of special finish details, insets and reliefs, reveals, expansion and control joints, brick ledges, brick head and sills, pipe penetrations and waterproofing materials. Provide roof edge flashing and gutter section (as applicable) in pre-finished color as selected by the Project Manager to cap the mock-up panel. Include a sealant joint at least 16 inches long.

1.8 TESTING SERVICES

A. The Design/Builder will appoint, employ, and pay for specified services of an independent firm to perform testing.

B. The independent firm will perform tests and other services specified in individual Design Standards sections and as required by the Architect/Engineer, or authority having jurisdiction.

C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required.

D. Reports will be submitted by the independent firm to the Owner, Architect, Engineer, General Contractor and the Project Manager, indicating observations and results of tests and indicating compliance or non-compliance with CONTRACT Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Project Manager and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual Design Standards sections.
2. Make arrangements with independent firm and pay for additional samples and tests required.

F. Testing does not relieve General Contractor to perform Work to CONTRACT requirements.

G. Re-testing required because of non-conformance to CONTRACT requirements shall be performed by the same independent firm on instructions by the Project Manager. Payment for re-testing will be the responsibility of the General Contractor.

H. Refer to Section 01 45 23, Testing and Inspecting Services, for additional information concerning testing, and submittal procedures and requirements for Testing Reports.

1.9 FIELD OBSERVATION

A. The Architect shall visit the site a minimum of once per week, and provide an Observation Report to the Owner's Project Manager within 48 hours of the site visit.

B. The Architect shall attend concrete pours, and provide an Observation Report to the Owner's Project Manager within 48 hour of the site visit.

C. The Architect's Observation Report shall include the following:

a. Date and time
b. Project name and number
c. Observer's name
d. Temperature and weathercondition
e. Personnel onsite
f. Equipment onsite
g. Work underway
h. Work scheduled to begin
i. Issues noted
j. Compliance of work in place with the requirements of the Contract Documents.
k. Photos

1.10 MANUFACTURERS' FIELD SERVICES

A. When specified in individual Design Standards sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as required, and to initiate instructions when necessary.

B. Submit cost and qualifications of observer to the Project Manager within ten (10) days after receipt of Notice to Proceed, in advance of required observations. Observer subject to approval of the Project Manager and Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01 33 00, Submittal Procedures, for additional information concerning submittal procedures and requirements for Manufacturers Field Reports.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Design Standards sections.

D. Verify utility services are available, of correct characteristics, and in correct locations.

3.2 PREPARATION

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

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION 014500

SECTION 014523 - TESTING AND INSPECTING SERVICES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. A qualified independent testing laboratory and/or geotechnical engineering service shall be selected and paid by the Owner, and approved by the Architect and Engineers, who shall perform professional testing and laboratory services specified herein.

Testing and Inspection Costs for passing tests and/or inspections shall be the responsibility of the OWNER.

All costs associated with Failed Tests and/or Inspections requiring re-testing and/or re-inspection, including any additional documentation required, shall be the responsibility of the CONTRACTOR. All costs associated with such tests shall be deducted from the Contractor's monthly Application For Payment.

B. Inspecting agency shall make and perform all inspections and tests in accordance with the rules and regulations of the building code, local authorities, Specifications of ASTM, and these Bid Documents.

C. Materials and workmanship not meeting required standards or performance obligations are to be removed and replaced. Replacement and subsequent testing shall be at Contractor's expense.

D. Where terms "Inspector" and "Laboratory" are used, they mean and refer to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Contractor.

E. All testing laboratory services will be provided and paid for by the General Contractor and the Project Manager shall be notified as soon as possible.

F. The Contractor will pay for the initial laboratory services of materials that comply with the requirements of the Construction Documents. The Contractor shall pay for testing and re- testing of materials that do not comply with the requirements of the Construction Documents.

G. Laboratory inspection shall not relieve the Contractor or Fabricator of his responsibility to furnish materials and workmanship in accordance with the Construction Documents.

H. The General Contractor shall cooperate with the testing laboratory in all matters pertaining to the work.

1.2 RELATED REQUIREMENTS

A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals or public authorities.

B. Respective Sections of Design Standards. Certification of products.

C. Each Specification Section Listed: Inspection and laboratory test required and standards for inspection and testing.

D. Testing laboratory inspection, sampling and testing is required for:

1. Section 033000 - Cast-In-Place Concrete
3. Division 5 - Metals: As specified or required for structural steel, open web steel joists, steel deck, miscellaneous metals, etc.
4. Division 7 - Thermal and Moisture Protection: As specified or required for waterproofing and roofing.
5. Division 7 - Fireproofing
6. Section 310000 - Earthwork
7. Section 312323 - Underground Utilities
8. Section 313200 - Soil Stabilization
9. Section 316329 - Drilled and Reamed Foundation
10. Section 321313 - Concrete Paving
13. As requested by the Owner, Architect, Project Manager, and/or the Contractor.

1.3 QUALIFICATIONS

A. Testing agencies shall meet requirements of ASTM E329, “Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction” and ASTM E543, “Standard Practices for Agencies Performing Non-Destructive Testing”.

B. Testing agencies shall be insured against errors and omissions by a professional liability insurance policy having a minimum limit of liability of $500,000.00.

D. Inspecting personnel monitoring concrete work shall be ACI certified inspectors.

E. Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, "Standard and Guide for Qualification and Certification of Welding Inspectors". Inspector may be supported by assistant inspectors who may perform specific inspection functions under supervision of the inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be regularly monitored by the inspector, generally on a daily basis.

F. Testing machines shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.

1.4 RESPONSIBILITIES OF CONTRACTOR

A. See respective technical sections for specific requirements.

B. Deliver to the laboratory, without cost to Owner, adequate quantities of representative samples of materials proposed for use which are required to be tested.

C. Advise laboratory and Project Manager sufficiently in advance of Construction operations to allow laboratory to complete any required checks or tests and to assign personnel for field inspection and testing as specified.

D. Provide adequate facilities for safe storage and proper curing of concrete test samples on project site for the first 24 hours and also for subsequent field curing as required by ASTM C31.

E. Furnish such nominal labor and equipment as is required to assist laboratory personnel in obtaining and handling samples at the site and in accessing work for inspection.

F. Furnish concrete mix designs, in accordance with ACI 301, Section 3.9, made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, the laboratory shall be selected and paid by the Contractor.

G. Obtain required inspections or approvals of the building official. All inspection requests and notifications required by building code are responsibility of the Contractor.

H. Provide current welder certificates for each welder to be employed.

I. Furnish fabrication/erection inspection and testing of all welds in accordance with AWS D1.1, Chapter 6.

J. Prequalification of all welding procedures to be used in executing the work.

1.5 AUTHORITY AND DUTIES OF LABORATORY PERSONNEL

A. A representative of the testing laboratory, who has reviewed and is familiar with the project and Design Standards, shall participate in all pre-Construction conferences. He shall coordinate material testing and inspection requirements with the Contractor and his subcontractors consistent with the planned Construction schedule. The laboratory representative shall attend, throughout the course of the project, such conferences as may be required or requested to address quality control issues.

B. Laboratory personnel shall inspect and/or test materials, assemblies, specimens, and work performed, including design mixes, methods and techniques and report to the Project Manager the progress thereof.

C. **Laboratory technicians do not act as foremen, or perform other duties for Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not, in any way, prevent later rejection when such defect is discovered.**

D. **If material furnished and/or work performed fails to meet requirements of Construction Documents, laboratory inspector shall promptly notify the Contractor, Architect, Engineer, Construction Manager, and/or subcontractor providing or preparing the materials or work being tested of such failure.**

D. **Laboratory inspector is not authorized to modify, add, increase, revoke, alter, relax, enlarge, or release any requirement of the Construction Documents or to approve or accept any portion of work, except where such approval is specifically called for in the Design Standards.**

F. Comply with all building code requirements for “Special Inspection” regardless of whether or not such inspections are specified herein.

1.6 SUBMITTALS

A. Submit copies of reports of each and every inspection and test as follows:

1. Contractor, Sub-contractor, Program or Project Manager, Architect, and each Engineer or outside consultants regarding their particular phase of the project: One (1) each

B. State in report all details of each inspection and test. Indicate compliance or noncompliance with requirements of Construction Documents. Also state in report any and all unsatisfactory conditions.

C. In addition to furnishing a written report, notify Construction Manager, if applicable, and Contractor verbally of any uncorrected conditions or failures to comply with requirements of the Construction Documents, and immediately Fax corresponding report to the Contractor, Project Manager and Engineer.

D. At completion of each trade or branch of work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of work and full compliance with requirements of Construction Documents.

E. Submit copies of test results, sealed by a Registered Engineer, to municipal authorities having jurisdiction, as required.

1.7 REFERENCED STANDARDS

A. Latest adopted edition of all standards referenced in this Section shall apply, unless noted otherwise. In case of conflict between these Construction Documents and a referenced standard, the Construction Documents shall govern. In case of conflict between Construction Documents and the Building Code, the more stringent shall govern.

1.8 TESTING LABORATORY GUIDELINES AND PROCEDURES

A. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the Project site.

B. The Contractor shall bear the responsibility of scheduling all of the test services. The Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services. Re-testing required because of non-conformance to Construction requirements shall be performed by the same independent firm on instructions by the Project Manager. Payment for re-testing will be the responsibility of the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 GENERAL

A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of Construction to ascertain specification compliance and which may be deemed necessary by Project Manager, Engineer, or Contractor to ensure the quality of the Work.

B. The Project Manager reserves the right to add to or delete any or all inspection and testing specified herein.

C. If conflicts arise between Drawings and Design Standards, notify Project Manager immediately. In any case the most stringent requirements shall dictate procedure.

3.2 TESTING OF EARTHWORK

A. Testing Services (As specified or required):

1. References (As applicable for tests required):

a. American Society for Testing and Materials (ASTM)

1) D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3 (600 kN-m/m3)
2) D2922, Standard Test Method for Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth)
3) D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

b. American Association of State Highway and Transportation Officials (AASHTO)

1) T89, Determining the Liquid Limit of Soils
2) T90, Determining the Plastic Limit and Plasticity Index of Soils

3) T99, Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop
4) T238, Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth)

2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab-on-grade, and backfills.
3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.
4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,
6. Perform one (1) in place density test for each 2,500 square feet (280 square yards) of existing subgrade material.
7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one (1) type of fill material. If the original choice of material does not meet the Design Standards, the Contractor shall pay for additional testing.
8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one (1) test for each 2,500 square feet (280 square yards) of each lift of compacted fill.
9. Perform testing at a frequency of one in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three tests per lift.

B. Reports: Submit reports with the following information:

1. Type and condition of soil at footing bottoms.
2. Level of water table in the excavated areas.
3. Grain size distribution of fill materials (average of three (3) tests).
4. Moisture density test results.
5. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
6. Notify Project Manager by telephone within one (1) hour of the discovery of the following conditions and follow up telephone notification with written report.

    a. Materials used, or degree of soil compaction not meeting specified requirements.

b. Frost and freeze protection requirements for excavation bottoms not being complied with.
c. Water in excavations which is not being removed prior to work being performed in excavation.

3.3 INSPECTION OF PIPED SITE UTILITIES

A. Laboratory representative shall observe and report on the following:
1. Proper alignment and grade of trenches.
2. Pipe bedding and supports.
3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
4. Installation of pipe and joints.
5. Testing of piped utilities performed by Contractor.

3.4 PAVING

A. Testing Services:

1. Perform field tests for moisture density properties:

a. Provide field testing of the sub-grade as described in Paragraph 3.2, A, above.
b. Paving sub-base, provide one (1) field test for every 5,000 square feet of area of crushed limestone or caliche sub-base, if any.
c. Lime treated sub-grade, provide one (1) field test for every 5,000 square feet of area of lime treated sub-grade, if any, for content of lime and sub-grade compaction.
d. Cement soil stabilization, if any, provide one (1) field test for every 5,000 square feet of area of cement stabilized sub-grade for content of cement and sub-grade compaction.

3.5 DRILLED PIER OPERATIONS

A. A qualified representative of the testing agency shall provide services herein specified.

B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.

C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.

D. Laboratory representative shall make continuous inspections of drilled pier Construction to check the following:

1. Verify soundness of bearing stratum and desired penetration.
2. Verify pier dimensions and reinforcing used.
3. Monitor condition of hole and removal of water and loose material from bottom.
4. Monitor placement of concrete and use of tremie or pumps.
5. Monitor the extraction of casing, if used.

E. Request probe holes when deemed necessary to confirm safe bearing capacity.

3.6 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES

A. Inspect all concrete reinforcing steel prior to placing concrete for compliance with Construction Documents and approved shop drawings. All instances of noncompliance with Construction Documents and approved shop drawings shall be immediately brought to the attention of the Contractor for correction and then, if uncorrected, reported to the Project Manager.

B. Laboratory representative shall observe and report on the following:

1. Number and size of bars.
2. Bending and lengths of bars.
3. Splicing.
4. Clearance to forms, including chair heights.
5. Clearance to sides and bottom of trench if soil formed.
6. Clearance between bars or spacing.
7. Rust, form oil, and other contamination.
8. Grade of steel.
9. Securing, tying, and chairing of bars.
10. Excessive congestion of reinforcing steel.
11. Installation of anchor bolts and placement of concrete around such bolts.

12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.

13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with CONSTRUCTION Documents. Check number, spacing and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.

C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three (3) years experience inspecting reinforcing steel in projects of similar size.

3.7 CONCRETE INSPECTION AND TESTING

A. Receive and evaluate all proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Design Standards, the laboratory shall submit a letter to the Project Manager certifying compliance. Mix designs not complying with Drawings and Design Standards shall be returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio and slump in accordance with ACI 613 and 318.

B. Comply with ACI 311, “Guide For Concrete Inspection” and ACI “Manual of Concrete Inspection” (SP-2).

C. Sample and test concrete placed at the job site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.

D. All concrete shall be tested as follows:

1. Mold and cure four (5) specimens from each sample.

   a. For each 50 cubic yards or fraction thereof of structural building concrete.
   b. For each 100 cubic yards or fraction thereof of non-structural concrete and site work paving and sidewalks.
   c. Laboratory cure two (2) cylinders in accordance with ASTM C192.
   d. Field cure remaining cylinders in accordance with ASTM C31.

2. TWO (2) specimens shall be tested at seven (7) days for information, two (2) shall be tested at 28 days for acceptance, and
3. Store one (1) cylinder for testing at 56 days in the event the 28 days strength tests do not meet strength requirements.

E. All deviations from the requirements of ASTM Specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.

F. **Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.**

G. Supervise curing and protection provided for test specimens in field, and transportation from the field to laboratory. Test cylinders shall be stored in the field 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.

H. Make one (1) strength test (four (4) cylinders) of each mix design of concrete placed in any one (1) day.

I. Make one (1) slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.

J. Determine total air content of air entrained normal-weight concrete sample for each strength test in accordance with ASTM C231.

K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.

L. Determine temperature of concrete sample for each strength test.

M. Inspect each batch of concrete, monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94.

1. Monitor addition of water and high-range water reducer to concrete at job site and length of time concrete is allowed to remain in truck during placement.

N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day's mixing. Inspector shall examine concrete materials for compliance with Design Standards and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that amount of free surface moisture contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.

O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to the Project Manager, Contractor and concrete supplier. Do not permit addition of water which will exceed maximum water/cement ratio for the mix as given on the approved mix design.

P. Observe placing of all concrete. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of reinforcement. Report deficiencies to Design- Builder immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.

Q. Test reports shall include but not be limited to the following information: date of concrete placement, concrete mix identification number or proportion of ingredients, truck ticket number, time test was made, time of batching, location of each placement, slump, unit weight, water content (microwave test) and air content of concrete sampled and date and results of strength test.

R. Report promptly to Contractor all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.

S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.

T. Evaluation and Acceptance:

1. If measured slump, or air content of air entrained concrete, falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure,

concrete shall be considered to have failed to meet the requirements of the Design Standards, and shall not be used in the structure.

2. Strength level of concrete will be considered satisfactory if the averages of all sets of three (3) consecutive strength tests results are equal to, or exceed, specified strength and no individual test result (average of two (2) cylinders) is below specified strength by more than 500 psi.
3. Completed concrete work will be accepted when requirements of "Specifications for Structural Concrete for Buildings", ACI 301, Chapter 18, have been met.

U. Concrete Test Reports:

1. Reports shall be made and distributed immediately after respective tests or inspections are made.
2. Where reports indicate deviations from CONSTRUCTION Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.

V. Furnish a statistical analysis for each class of concrete placed on the project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Project Manager. Information shall include, but not be limited to, the following:

1. Strength tests at seven (7) days.
2. Strength tests at 28 days of two (2) cylinder averages.
3. 28-day moving average strength tests of last three (3) test groups.
4. Standard deviation and coefficient of variation based on 28 day strength tests.
5. Average strength and number of 28 days tests for most recent month.
6. Strength test one (1) cylinder at 56 days in the event the 28 days strength tests do not meet strength requirements.

W. Test Footings (Shafts) (Piers) (Caissons): Same diameter and type as specified for other footings, placed in same manner. Accepted test footings may be used in the Work.

X. Non-Compliant Test Reports: All test reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.

Y. Inspect application of curing compound and monitor all curing conditions to assure compliance with specification requirements. Report curing deficiencies

to the Design- Builder immediately and submit a written report to the Project Manager.

3.8 TESTING OF NON-SHRINK GROUT

A. Make one (1) strength test for all plates grouted and for all grout used in joints between members.

B. Each test shall consist of four (4) cubes, two (2) to be tested at seven (7) days and two (2) at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

3.9 STRUCTURAL STEEL

A. Inspect structural steel during and after erection for conformance with CONSTRUCTION Documents and shop drawings. Review and report on fabricator's quality control procedures and capabilities.

B. Field Inspection:

1. Proper erection of all pieces.
2. Proper touch up painting of all shop primed structural steel exposed to view or in a crawl space.
3. Proper installation of all bolts.
4. Plumbness of structure and proper bracing.
5. Proper field painting.
6. Initial inspection of welding process and periodically thereafter, as necessary.
7. Visual examination of all completed welds.
8. Ultrasonic testing of all penetration field welds.
9. Installation of field welded shear studs.
10. Inspect all shop fabricated members, upon their arrival at the jobsite, for defects incurred during transit and handling.
11. Measure and record camber of all beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Members outside specified camber tolerance shall be returned to shop for correction.

C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders to be employed on work, along with certification that each welder has passed qualification tests within the last 12

months, using procedures covered in AWS D1.1, "Structural Welding Code - Steel", latest edition. Verify all welder qualifications.

D. Inspection of field welding shall include the following:

1. Visually inspect fillet welds for size, soundness, and proper return around ends. Check for seams, folds, and delaminations.
2. Visually inspect all welds for proper repair of painting.
3. Ultrasonically test all penetration welds in accordance with ASTM E164.
4. Inspect surfaces to be welded. Surface preparations, fit-up and cleanlinessof surface shall be noted. Electrodes shall be checked for size, type and condition.
5. Welding inspector shall be present during alignment and fit-up of members being welded, and shall check for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely, inspector shall order the joint to be chipped down to sound metal, or gouged out, and re-welded. Root passes shall be thoroughly inspected for cracks. All cracks shall be gouged out and re-welded to two (2) inches beyond each end of crack.
6. Inspector shall check that all welds have been marked with welder's symbol and shall mark welds requiring repairs and shall make a re-inspection. Inspector shall maintain a written record of all welds. Work completed and inspected shall receive an identification mark by the inspector. Unacceptable material and work shall be identified by word "reject" or "repair" marked directly on the material.
7. Testing agency shall advise the Contractor and Project Manager of any shop and/or field conditions which, in his opinion, may require further tests and examination by means other than those specified. Such further tests and examinations shall be performed as authorized by the Contractor and Project Manager.
8. Project Manager reserves the right to use ultrasonic or radiographic inspection to verify adequacy of all welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
9. Weld quality to comply with the American Institute of Steel Construction Manual of Steel Construction.
10. Percentage of weld tested will be determined by the number of welds that fail the initial testing.
11. All welds that fail shall be re-welded and re-tested until they pass. Test two (2) additional welds for every weld failure at the Contractor's expense.

E. Inspection of bolted Construction shall be in accordance with AISC "Specification for Structural Steel Buildings" as follows:

1. All bolts shall be visually inspected to ensure that plies have been brought into snug contact.
2. High strength bolting shall be inspected in accordance with Section 9 of the "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".

F. Inspection of stud welding shall be in accordance with Section 7.8, of the AWS D1.1, Structural Welding Code, and as follows:

1. Minimum of two (2) shear studs shall be welded at the start of each production period in order to determine proper generator, control unit and stud welder setting. These studs shall be capable of being bent 45 degrees from vertical without weld failure.
2. When temperature is below 32 degrees F, one (1) stud in each 100 shall be tested after cooling. Studs shall not be welded below 0 degrees F or when surface is wet with rain or snow. If the stud fails in the weld, two (2) new studs shall pass the test before resumption of welding.
3. Visually inspect studs for compliance with Construction Documents. Check, number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud, such stud shall be struck with a hammer and bent 15 degrees off perpendicular in the direction away from the missing weld. Studs failing under this test shall be replaced.

3.10 REINFORCING STEEL MECHANICAL SPLICES

A. Inspection and Observation Services:

1. Visually inspect and report on the completed condition of each mechanical splice of reinforcing steel.
2. Each mechanical splice shall be visually inspected to ensure compliance with the I.C.B.O. Reports and the manufacturer's published criteria for acceptable completed splices.
3. Special emphasis shall be placed on inspection of the end preparation of each bar to be spliced, as required by the I.C.B.O. Report.

B. Reports: Submit reports to Project Manager with the following information:

1. Submit copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.

2. Reports on each mechanical splice shall indicate location of the splice, size of bars spliced, and acceptability or rejection of splice. Reasons for rejection shall be shown on each report.

3.11 OPEN WEB JOISTS AND JOIST GIRDERS

A. Inspect all joists at jobsite for conformance with specified fabrication requirements. Check welded connections between web and chord, splices, and straightness of members.

B. Inspect installation of joists at jobsite. Check connections to supporting members, chord extensions, number of rows of bridging, and bridging connections for conformance with Construction Documents and referenced standards.

C. Check welder qualification certificates for both shop and field welding operators.

3.12 METAL FLOOR DECK

A. Field inspection shall consist of the following:

1. Checking types, gauges and finishes for conformance with Construction Documents and shop drawings.
2. Examination of composite floor deck exposed to crawl space, for damage to galvanizing due to welding or other Construction activities. Galvanized composite floor deck shall be repaired in accordance with these Design Standards.
3. Examination for proper erection of all metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting or other coating.
4. Certification of welders.
5. Field welded shear studs used to fasten metal floor decking to supporting steel shall be inspected and tested as described in the paragraph addressing structural steel.

3.13 METAL ROOF DECK

A. Field inspection shall consist of the following:

1. Checking types, gauges and finishes for conformance with Construction Documents and shop drawings.

2. Examination for proper erection of all metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
3. Certification of welders.
4. Visual inspection of at least 25 (twenty-five) percent of all welds.

3.14 SPRAYED FIREPROOFING

A. Verify that applied thickness, density, and bond strength of sprayed fireproofing meets fire rating requirements of approved design.

B. Verify that installation meets fire rating requirements of approved design.

C. Inspect and test for thickness as follows:

1. Test twenty-five (25) percent of structural frame columns and beams in each building level.
2. Test ten (10) percent of beams other than structural frame in each building level.
3. Test one (1) slab per 5,000 square feet of building area.

D. Inspection and test procedures in accordance with ASTM E605 and E736.

3.15 EXPANSION BOLT INSTALLATION

A. Inspect drilling of each hole and installation of each expansion bolt for conformance with Construction Documents and shop drawings.

B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

3.16 TESTING OF ROOFING

A. Inspection and Observation Services (As required):

1. Inspection of roof deck prior to start of work.
2. Inspect on-site condition of stored roofing materials.
3. Inspection during roofing, roof insulation, and sheet metal work to ascertain compliance with Construction Documents.
4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.

5. Observation of patching of roof test cuts to ascertain that they are properly made.

B. Testing Services (As required)

1. Perform dissection and analysis on cuts provided by Contractor to number of plies, bonding of plies, weight of bitumen and softening ascertain compliance with Design Standards.

3.17 MASONRY

A. Inspection and Observation Services:

1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
2. Review mortar design mixes.
3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.

B. Testing Services:

1. References (As applicable for tests required):

a. ASTM International (ASTM)

1) C140, Standard Test Methods of Sampling and Testing Concrete Masonry Units
2) C780, Standard Test Method for Pre-Construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
3) C1019, Standard Test Method for Sampling and Testing Grout
4) E447-97, Standard Test Methods for Compressive Strength of Laboratory Constructed Masonry Prisms

2. Testing of Concrete Masonry Units (CMU):

a. Pre-Construction: Perform the following tests in accordance with ASTM C140.

1) Compressive Strength
2) Absorption
3) Weight
4) Moisture Content

5) Dimensions

3. Mortar Tests:

   a. Pre-Construction: Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project.

      1) 28-Day Compressive Strength
      2) Water Retention

   b. Construction: Perform 28- day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.

4. Refer to and include work for reinforcing steel specified in Paragraphs 3.5 and 3.6 above.

5. Grout Tests:

   a. Pre-Construction: Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project.

      1) Slump Test
      2) 28 Day Compressive Strength
      3) Construction: Perform 28-day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
      4) Prism Test: Perform Pre-Construction 28-day compressive strength test on concrete masonry walls in accordance with ASTM E447-97, Method B.

END OF SECTION 014523

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. See Divisions 2 through 16 Sections for specific requirements for temporary heat, ventilation, and humidity control requirements for products in those Sections.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.3 TEMPORARY UTILITIES & USE CHARGES

A. General: Unless otherwise specified herein, all utility costs or use charges for temporary facilities shall be included in the Contract Sum. The Contractor shall allow other entities to use temporary services and facilities without cost, including, but not limited to: the Owner's Representatives, Architect, Testing Agencies, and Authorities Having Jurisdiction.

B. **Temporary Water Service: Water from the Owner's existing water system WILL be available for the Contractor's use, without metering, and without payment of use charges.**

The Contractor shall provide connection to, and extension of, the Owner's existing water service, as required for construction operations. The Contractor shall make provisions to extend the Owner's existing water service for extended or remote areas of the site.

The Owner reserves the right to restrict or terminate the Contractor's use of Owner's water service at no charge, due to abuse or wanton waste.

In such case, provisions and payment for water for construction use will become the responsibility of the Contractor, and no Change to the Contract will be considered.

Where determined by the Contractor to be impractical or cost-prohibitive to extend the Owner's existing water service, the Contractor shall make other provisions for temporary water service, at no additional cost to the Owner.

C. **Temporary Electrical Power Service: Electric power from the Owner's existing electrical system WILL be available for the Contractor's use, without metering, and without payment of use charges.**

The Contractor shall provide connection to, and extension of, the Owner's existing electrical service, as required for construction operations. The Contractor shall make provisions to extend the Owner's existing electrical service for extended or remote areas of the site.

The Owner reserves the right to restrict or terminate the Contractor's use of Owner's electrical service at no charge, due to abuse or wanton waste.

In such case, payment for electrical service for construction use will become the responsibility of the Contractor, and no Change to the Contract will be considered.

Where determined by the Contractor to be impractical or cost-prohibitive to extend the Owner's existing electrical service, the Contractor shall make other provisions for temporary electrical service, at no additional cost to the Owner.

1.4 TEMPORARY FENCING

A. Provide temporary barricades as required by the Owner to maintain the safety of occupants, and the general public.

1. Provide rigid barricades, between work areas and occupant areas, including pedestrian walkways, building ingress/egress points, and driveways.

Rigid barricades shall be 6' high chain link fencing with ground-set posts, and continuous top and bottom tension wires or rails, as is required for the application.

Panel-type systems may be utilized in applications where debris screen is not required.

2. **At locations where occupants will be in close proximity to the work, provide opaque mesh screening, to protect occupants from debris, and to visually separate occupants and workers.**

3. **Flexible orange safety fencing may be used for material storage areas, or to direct vehicular or automobile traffic, or as a perimeter barricade around trees and/or other areas that are off limits to construction traffic.**

4. **Flexible orange safety fencing is not acceptable for separation of occupants from work areas.**

5. **No work shall commence on the site, until temporary barricades have been installed, inspected, and approved by the Owner.**

6. **The Owner reserves the right to stop the work at any time that barricades have been removed or damaged, as necessary to protect the safety of the Students, employees, or visitors.**

7. **No additional compensation will be made to the Contractor for work stoppages resulting from safety-related issues caused by the Contractor or his Subcontractors.**

1.5 SUBMITTALS

A. Site Plan

1. Prior to mobilization, provide a Site Plan, indicating proposed locations for temporary fencing, gates or other site access controls, construction area access, location of the job trailer, location of storage containers or trailers, locations of toilets and other temporary facilities, utility hookups, material storage and staging areas, parking areas for construction personnel, and all other pertinent information, for the Owner's approval and comment.

1.6 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.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for the 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 (AS MAY BE APPLICABLE TO THE PROJECT)

A. Temporary Drives: Cement-Stabilized Soil, Limestone, Hot-Mix Asphalt Paving, or Concrete Pavement, as deemed necessary by the Contractor, or as specified to maintain access to areas as required by the Contract.

B. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high or 8 feet (2.4m) with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

C. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

D. Wood Enclosure Fence: Plywood, 8 feet (2.4 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails or vertical studs, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart, or as required for the specific application.

E. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

F. Insulation: Where temporary enclosures are required to be insulated, provide unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, in thicknesses as indicated on the Drawings.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage Units: Provide secure, weathertight lockable storage units or containers, appropriate for the storage of materials on site.

C. Fabrication Sheds: Provide temporary sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Heating Equipment: Unless Owner authorizes use of permanent heating 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 testing agency acceptable to authorities having jurisdiction, and marked for intended use.

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.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

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 the municipal system or private system, if indicated on the Drawings, as directed by the Owner or authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction requirements.

D. Water Service: If acceptable to the Owner, use of Owner's existing water service 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.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

F. Temporary Heating and Cooling: Provide temporary heating and cooling as required by construction activities for curing or drying of completed installations, or for protecting installed construction from adverse effects of low or high temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. 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.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Temporary electric power service may be installed overhead or underground, unless specifically indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone and Data Services:

1. Provide telephone-based, cable-based, or wireless-based electronic communication services as described below:

a. Dedicated land-based telephone line(s) ~~WILL /~~ WILL NOT be required for telephone(s) in each field office.

b. Dedicated land-based telephone line(s) ~~WILL /~~ WILL NOT be required for facsimile machine(s) in each field office.

c. Dedicated land-based telephone or cable line(s) ~~WILL /~~ WILL NOT be required for computer(s) in each field office.

d. **Provide the superintendent with cellular telephone for use and contact at all times.**

1. In the Contractor's Field Office, post a list of important telephone numbers including police and fire departments, Contractor's home office, Architect's office, Owner's office, Principal subcontractors' field and home offices.

K. Electronic Communication Service: Provide superintendent with electronic mail service, either in the field office, laptop computer, or by portable personal communication device.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. 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 required for access or as indicated on the Drawings.

1. Provide dust-control treatment that is non-polluting and non-tracking. Reapply treatment as required to minimize dust.

C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. 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 subgrade and install subbase and base for temporary roads and paved areas to be incorporated into final work according to Division 2 Section "Earthwork."

3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing, as necessary to comply with requirements for Construction.
4. Delay installation of final course of permanent hot-mix asphalt pavement, if applicable, until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 2 Section "Hot-Mix 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 parking areas, or use designated areas of Owner's existing parking areas for construction personnel, as directed by the Owner.

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 nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Identification and Temporary Signs: Provide Project identification and other signs as required. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

H. 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 Division 1 Section "Execution Requirements" for progress cleaning requirements.

I. 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.

J. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

K. Existing Elevator Use: Use of Owner's existing elevators, if applicable, will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs, if applicable, will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

C. Stormwater Control: Comply with requirements of the authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. 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. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Prior to commencement of construction operations, 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: Sufficient to accommodate construction operations, unless otherwise indicated on Drawings.

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
3. Provide the Owner and/or Architect each with one set of keys.
4. Provide additional fencing and/or barricades at locations of excavation, prior to beginning excavation operations.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. 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 weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: If applicable, provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and/or tenants from dust, fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.

2. Construct dustproof partitions with 2 layers of 3-mil (0.07-mm) polyethylene sheet on each side. Cover floor with 2 layers of 3-mil (0.07-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.

    a. Where required, construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
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.

1. Prohibit smoking in enclosed 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 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 to work completed and/or in place.

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 the Contractor.
2. The Owner reserves right to take possession of Project identification signs.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 015010 - PROJECT SIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes provisions for Signage to be erected at the Project site, including, but not limited to, the following:

1. Construction Project Sign(s)
2. General Safety and/or Informational Signage.

1.2 CONSTRUCTION PROJECT SIGN

A. General: The Contractor shall include in the project, Construction Project Sign(s) with the following information, as related to the Project.

1. Quantity Required: **One (1) each**
2. Sign Size: **8'-0" x 8'-0"**
3. Orientation: **Vertical**
4. Color Requirements: **Provide Full Color for all Copy and Logos.**
5. Color Images: **A high-resolution project rendering WILL be required for this project. Image file will be provided to the Contractor by the Architect.**
6. Information to be included on sign:
   a. **Project Name**
   b. **Owner's Project Number (if applicable)**
   c. **Dates (if applicable)**
   d. **Funding Sources (if applicable)**
   e. **Other pertinent information (as may be applicable)**
   f. **Owner's Name and Logo**
   g. **Architect's Name and Logo**
   h. **Contractor's Name and Logo**
   i. **Construction Manager's Name and Logo**
   j. **Owner's Grants Manager's Name and Logo**

B. Installation: Install sign(s) and maintain in good condition throughout the duration of the Project. Inspect project sign regularly, and promptly make repairs, as needed.

1. Posts: **(3) 8"x8" Treated Pine**
2. Overall (exposed) height: **10'-0"**

3. Footings: **Concrete Diameter = 16"**
   Embed Depth = Exposed Height / 3 (minimum) = 14' L. Posts
4. Braces: **2"x6" / 2"x8" treaded pine, as is appropriate.**

1.3 SITE SAFETY AND/OR INFORMATIONAL SIGNS

A. General: The Contractor shall provide, install, and maintain signs as deemed necessary to provide pertinent information to employees, visitors, and the general public.

1. The Contractor shall provide and install safety and/or informational signs, as the Contractor deems necessary to inform employees and/or visitors to the Project Site, and the general public in the vicinity of the Project Site, of pertinent safety and/or general information as related to the Project Site.

B. Installation: Install sign(s) and maintain in good condition throughout the duration of the Project. Inspect signs regularly, and promptly make repairs, as needed.

END OF SECTION

SECTION 017200 – CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Construction Surveying.

1.2 QUALITY ASSURANCE

A. The contractor shall retain the services of a Professional Land Surveyor, licensed in the State of Louisiana for the services included in this section.

PART 2 - EXECUTION

2.1 SERVICES

A. A licensed surveyor shall, at a minimum, provide the following services:

1. Provide no less than (2) Temporary Benchmark Elevations on each project site, located so as to remain available for the duration of the project.
2. Provide construction staking of all underground utilities to be protected.
3. Provide construction staking of all slab on grade components verifying location conforms to the requirements of the Construction Documents.
4. Provide construction staking of all existing and new shaft locations to ensure conformance with bid documents.
5. **Confirm vertical heights of structural components to ensure that the "finished floor" elevation conforms to the requirements of the Construction Documents.**
6. **For each building, or buildings, and associated equipment pads or platforms, and prior to pouring any concrete slabs, the Contractor shall employ a Louisiana Licensed Land Surveyor to field verify and prepare for Project Record and for Permitting Authorities, a "TOP OF FORMWORK" Elevation Certificate.**

7. **For each building, or buildings, and for associated equipment pads or platforms, the Contractor shall employ a Louisiana Licensed Land Surveyor to field verify and prepare for Project Record and for Permitting Authorities at Substantial Completion, a final "CERTIFICATE OF ELEVATION" for each building or buildings, per the following requirements:**

   Provide a FEMA National Flood Insurance Program Elevation Certificate for each building or buildings. The elevation certificate is to be completed and stamped by a Professional Land Surveyor, licensed in the State of Louisiana, in strict accordance with FEMA's National Flood Insurance Program (N.F.I.P.) requirements, and shall include photographs where required.

   The Elevation Certificate(s) for each building or buildings shall be prepared in accordance with and under the assumption that it is intended to support a LOMA or LOMR-F request.

END OF SECTION 017200

SECTION 017700 – PROJECT CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect 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. Reinspection: Request reinspection 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.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit 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.

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.

1.5 WARRANTIES

A. Submittal Time: 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.

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, 3-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.

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.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide 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 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; shampoo 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. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017839 - PROJECT RECORD DOCUMENTATION

PART 1 - GENERAL

1.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work, as changes are made:

1. Drawings.
2. Specifications.
3. Addenda.
4. Architects/Engineers written responses to Requests for Information, Architect's Supplemental Instructions, Field Orders', Minor Change Directives, and Construction Change Directives.
5. Change Orders and other modifications to the Contract.
6. Proposal Requests, and other supplemental instructions.
7. Reviewed Shop Drawings, Product Data, and Samples.
8. Manufacturer's instructions for assembly, installation, maintaining, and adjusting of items installed in the Project.

B. Ensure entries are complete and accurate, enabling future reference by Owner. The Architect and Owner's Project Manager will review documents for general conformance, however, the Contractor will be solely responsible for completeness and accuracy of the documentation and other information.

C. Do not use Record Documents for construction purposes. Store Record Documents separate from documents used for construction. Protect Record Documents from deterioration and loss in a secure, weather-tight location in accordance with Section 015000, Temporary Facilities and Controls.

D. Record information concurrent with construction progress, not less than weekly.

E. Provide access to record documents for Owner's and Architect's reference during normal working hours.

F. Give particular attention to information on concealed products and installations that would be difficult to identify or measure and record later.

G. Mark record sets in red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.

1. Mark important additional information which was either shown schematically or omitted from original Documents.
2. Note Construction Change Directive numbers, Alternate numbers, Change Order numbers, and similar identifying information.
3. Where feasible, the individual or entity who obtained record data, whether the individuals or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record documents.
4. Accurately record information in an understandable drawing technique.
5. Record data as soon as possible after it has been obtained. In the case concealed installations, record and check the mark-up prior to concealment.
6. Sign or initial and date each mark-up.

1.2 RECORD SPECIFICATIONS

A. Record Specifications: Maintain one complete copy of the Project Manual including addenda and modifications issued. Legibly mark and record at each product section a description of actual products installed and variations in actual Work performed in comparison with products specified. Include the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.
4. Related record drawing information and Product Data.
5. Other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.

1.3 RECORD DRAWINGS

A. Record Drawings: Maintain one complete blackline copy of the Drawings, Specifications, and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown.

1. Legibly mark each item to record actual construction including, but not limited to the following:

a. Measured depths of foundations in relation to project finish floor datum.
b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
d. Field changes of dimension and detail.
e. Details not on original Drawings.
f. Revisions to details shown on the Drawings.
g. Dimensional changes to the Drawings.
h. Actual equipment locations.
i. Duct size and routing.
j. Changes made by Change Order; include change order number.

2. Mark completely and accurately record prints of Drawings, Specifications, and Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked to reflect changes in the Work, record a cross-reference at the corresponding location on the Drawings.

3. Prepare a full set of corrected reproducible Drawings and Shop Drawings.

4. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing. Refer instances of uncertainty to the Architect for resolution.

1.4 RECORD PRODUCT DATA

A. Maintain one copy of each Product data submittal for record document purposes. Mark Product Data to indicate the actual product installation. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.

1.5 RECORD PRODUCT SAMPLES

A. Immediately prior to date of Substantial Completion, meet with the Project Manager, and Owner, at the Owner's discretion, at the site to determine which of the Samples maintained during the construction period shall be transmitted to Owner for record purposes.

1. Comply with the Architect's instructions for packaging, identification marking, and delivery to Owner's Sample storage space.
2. Dispose of other Samples in manner specified for disposal of surplus and waste materials.

1.6 MISCELLANEOUS RECORD DOCUMENTS

A. Refer to other Specification Sections for additional miscellaneous record-keeping requirements and submittals in connection with various construction activities.

B. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records, include, but are not limited to the following:

1. Ambient and substrate condition tests
2. Inspections and certifications by governing authorities.
3. Fire resistance and flame spread test results.

1.7 **DELIVERABLES**

A. Project As-Built Drawings

1. Provide the Owner with (1) original, marked-up copy of the Project As-Built Drawings.
2. Provide the Owner with (1) scanned copy of the Project As-Built Drawings, on a Portable USB (thumb) Drive.

B. Operation, Maintenance, & Warranty Manuals

1. Provide the Owner with (3) original, locking "D" type, 3-ring binders, which include Operation, Maintenance, & Warranty documentation of all products utilized within the building. Sorted and divided by Division and/or Specification Section, as may be appropriate.

Include a listing of all Subcontractors and Material Suppliers utilized on the project.

Also, include Color Schedules, Door Schedules, Window Schedules, Hardware Schedules, Signage, Specialty Items, Mechanical, Plumbing, and Electrical Items, and other information which may be relevant to the Owner, or his maintenance crews, for future reference.

2. Provide the Owner with (1) Portable USB (thumb) Drive, which includes Operation, Maintenance, & Warranty documentation of all products utilized within the building, sorted and divided by Division and/or Specification Section, as may be appropriate.

Organize into folders and sub-folders, as may be appropriate for organization and rapid location of items as desired.

Include a listing of all Subcontractors and Material Suppliers utilized on the project.

Also, include Color Schedules, Door Schedules, Window Schedules, Hardware Schedules, Signage, Specialty Items, Mechanical, Plumbing, and Electrical Items, and other information which may be relevant to the Owner, or his maintenance crews, for future reference.

1.8 CERTIFICATION

A. By submittal of Project Record Documents, the Contractor certifies, that to the best of his knowledge, information, and belief the documents are a true and complete representation of the actual construction of the Work of this Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building(s), structure(s), paving, and/or other miscellaneous items.
2. Demolition and removal of selected site elements.
3. Salvage, storage, and protection of existing items to be reused, recycled, or turned over to the Owner.

B. Refer to Division 2 "Site Work" for site clearing and removal of above-and below-grade improvements, where applicable.

C. **Coordinate with the Owner and Architect prior to commencement of demolition for items indicated to be removed by the Owner, and items to be removed by the Contactor and turned-over to the Owner.**

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner**,** ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. **Pre-demolition Documentation: The Contractor shall make Photographic and/or Video documentation indicating the existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by the Contractor's selective demolition operations. Comply with Division 1 Section 013231 "Pre-Construction Documentation." Submit documentation to the Owner, for their records, prior to commencement of selective demolition operations.**

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1. Comply with submittal requirements in Division 1 Section "Construction Waste Management."

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Conduct conference including the Owner, Architect, Contractor, and applicable Subcontractors at the Project site, prior to commencement of any selective demolition operations.

1.5 PROJECT 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.

1. No sooner that 28 days prior to commencement of selective demolition operations, notify the Owner in writing of the date of commencement and schedule of selective demolition operations, so that the Owner may have sufficient time to remove any items to be salvaged.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Any known Hazardous materials will be removed by the Owner prior to the start of Work, or will be removed by the Owner under a separate Contract.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner in writing.
3. The Owner will employ an independent testing lab to determine the composition of any suspected hazardous materials.
4. If the suspected materials are deemed to be hazardous, the Owner will remove such materials under a separate Contract.

E. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner in writing.
2. The Owner will employ an independent testing lab to determine the composition of any suspected hazardous materials.
3. If the suspected materials are deemed to be hazardous, the Owner will remove such materials under a separate Contract.

F. Storage or sale of removed items or materials on-site is not permitted.

G. **Utility Services: Locate, maintain, and protect existing utilities indicated to remain in service and protect them against damage during selective demolition operations.**

1. **Contact Louisiana OneCall at 811, for location of underground utilities, prior to performing and excavation or demolition activities.**

2. **Maintain fire-protection, water, sewer, climate control, and electrical facilities in service during selective demolition operations.**

3. **Existing utilities which must be removed to accommodate selective demolition operations shall be terminated, prior to start of selective demolition operations. Upon completion of selective demolition operations, utilities shall be reconnected, properly tested, inspected by the Authorities Having Jurisdiction, and services restored.**

4. **Any utility shut-downs must be coordinated with, scheduled, and approved by the Owner, prior to commencing.**

5. **Schedule and coordinate work phases, so as to maintain climate control at the building, in order to protect and prevent damage to interior finishes.**

    a. The Contractor shall be solely responsible for repairs and/or damage to building interior finishes, including mold remediation if required, that may occur as a result of the Contractor's failure to maintain climate control of the existing building(s).

6. Schedule and coordinate work phases, so as to maintain weathertightness of the at the building, in order to protect and prevent damage to interior finishes.

    a. The Contractor shall be solely responsible for repairs and/or damage to building interior finishes, including mold remediation if required, that may occur as a result of the Contractor's failure to maintain weathertightness of the existing building(s).

1.6 WARRANTY

A. The Contractor shall, at his own expense, remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

B. Any items or materials scheduled to remain which are damaged during the course of selective demolition operations are to be repaired or replaced by the Contractor at no additional expense to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and document the condition of items to be removed and reinstalled and items to be removed and salvaged. *Refer to Section 013231 "Pre-Demolition Documentation", Part 1.3.B for requirements.*

D. When unanticipated structural elements, mechanical, electrical, low-voltage controls, data/comm, special systems, or other items or systems that conflict with the scheduled demolition or the intended function or design are encountered, do not disturb. Investigate and measure the nature and extent of conflict, and immediately notify Architect in writing.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. **Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, preconstruction videotapes, and other measures as required to accurately document all existing conditions.**

1. Document any utilities encountered on the Project As-Built drawings.

2. Comply with requirements specified in Division 1 Section "Photographic Documentation", if applicable.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. **Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.**

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. 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.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: 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.

1. If necessary, employ the services of a Professional Engineer, licensed in the State of Louisiana to design and inspect shoring, bracing, and structural supports as detailed above.

3.4 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, to minimize disturbance of adjacent surfaces. 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 fire watch and portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Division 1 Section "Construction Waste Management."

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

1. Building Structure and Shell: As indicated.
2. Non-shell Elements: As indicated.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area as indicated on the Drawings or otherwise designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
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.

E. 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.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill, based on the type and nature of the items to be disposed.

1. Comply with requirements specified in Division 1 Section "Construction Waste Management."

B. Burning: Do not burn demolished materials on site.

C. Burying: Do not bury demolished materials on site.

D. Disposal: Haul demolished materials off of Owner's property, and dispose of in accordance with all applicable Federal, State, and Local regulations.

3.6 CLEANING

A. Clean surrounding areas, 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 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

B. Related Requirements:

1. Section 033000 “Cast-in-Place Concrete”
2. Section 321313 "Concrete Paving"

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

B. Shop Drawings: Comply with ACI 315-18 (Manual of Standard Practice for Detailing Reinforced Concrete Structures) and CRSI MSP-1 (Manual of Standard Practice), 29th Edition:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

C. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain.

2.4 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 48 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (latest edition).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel-reinforcement placement.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete standards.
2. Concrete materials.
3. Admixtures.
4. Vapor retarders.
5. Curing materials.
6. Accessories.
7. Repair materials.
8. Concrete mixture materials.
9. Concrete mixture class types.
10. Concrete mixing.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcing"
2. Section 072600 “Vapor Retarder”
3. Section 312000 "Earth Moving"
4. Section 321313 "Concrete Paving"

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.

3. Aggregates.
4. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

5. Vapor retarders.
6. Curing materials.
7. Joint Fillers
8. Repair Materials

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Placement location
3. Minimum 28-day compressive strength.
4. Maximum w/cm.
5. Slump limit or slump flow limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Intended placement method.
9. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. As specified in Section 032000 “Concrete Reinforcing”.

2. Construction Joint Layout: If not shown on Drawings, indicate proposed construction joints required to construct the structure.

    a. Location of construction joints is subject to approval of the Engineer.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include documentation indicating compliance with ASTM E329 or ASTM C1077 and copies of applicable ACI certificates for testing technicians or ACI Concrete Construction Special Inspector - MH, ASCC.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.

3. Curing compounds.
4. Floor and slab treatments
5. Bonding agents.
6. Adhesives
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

B. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

C. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to owner, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94 and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

2. Concrete is not to be placed if temperature is below or expected to fall below 40 deg F. Place concrete only when temperature is 40 deg F or higher and rising.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type I/II, IL gray.
2. Fly Ash: ASTM C618, Class C.

C. Normal-Weight Aggregates: ASTM C33, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494, Type A.

2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

F. Water and Water Used to Make Ice: ASTM C94, potable.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape. Comply with requirements of Section 072600 “Vapor Retarder.”

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Manufacturers: Subject to compliance with requirements, providers include, but are not limited to, the following:

a. BASF Corporation.
b. Dayton Superior.
c. Euclid Chemical Company (The); an RPM company.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

D. Water: Potable or complying with ASTM C1602.

E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

1. Basis of Design: W.R. Meadows, 1100

2. Alternatives that are shown to meet or exceed specifications of the basis of design product will be acceptable.

2.5 RELATED MATERIALS

A. Metal Keyed Joint System: 24 gauge, hot dipped galvanized with removable cap for formation of sealant reservoir.

1. Basis of Design: QuicKey by BoMetals, Inc.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

1. Basis of Design: MM-80 by Metzger McGuire

C. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.j To be used at slab areas to receive floor coverings.

1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested in accordance with ASTM C109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations. To be used at exposed slab surfaces.

1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

2.7 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: Class C, 15 percent by mass. The use of fly ash is an option, not a requirement.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.8 CONCRETE MIXTURES

A. Normal-weight concrete.

1. Exposure Class: ACI 318; F0, S0, W0, C0.
2. Minimum Compressive Strength: 3000 psi at slabs and 4000 psi at grade beams at 28 days.
3. Maximum w/cm:
   a. 0.57 (non-air entrained 4000 psi concrete)
   b. 0.68 (non-air entrained 3000 psi concrete)
4. Slump Limit: 4 inches, plus or minus 1 inch; 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. No entrained air

6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

7. “Performance” type mixes with variances in the (above) parameters of 3 and 4 (only) submitted with satisfactory testing and performance documentation will be considered.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 (90 minutes), and furnish batch ticket information.

1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 TOLERANCES

A. Comply with ACI 117.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.5 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions. Comply with requirements of Section 072600 “Vapor Retarder.”

3.6 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints in Slab-on-Grade: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Engineer. Submit layout plan for review if not indicated on drawings.

2. Form doweled and keyed joints with sealant reservoir using metal keyed joint system as indicated on drawings. Embed keys at least 1-1/2 inches into concrete or otherwise to depth indicated on drawings.
   a. Install dowel bars as indicated on Drawings.
   b. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane control joints, sectioning concrete into areas as indicated. Contraction joints to be a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks. Timing of cutting shall be performed so as to not damage concrete but also prior to cracking of concrete. Any damage to the concrete resulting from cutting (or not cutting) of joints at appropriate times shall be repaired by the Contractor with no modifications to the contract amount or duration.
2. Construction joints, as specified above, may be used as contraction joints at Contractor’s option.

D. Isolation Joints in Slabs-on-Ground: Install joint-filler at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings. Use manufacturer's cutter to score material to depth required for installation of joint material.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3. Remove scored section of joint-filler after placement of concrete and provide joint sealant as specified.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Engineer and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Level concrete, cut high areas, and fill low areas.
5. Slope surfaces uniformly to drains where required.
6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
7. Do not further disturb slab surfaces before starting finishing operations.

3.8 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
    b. Remove projections larger than 1 inch.
    c. Tie holes do not require patching.
    d. Surface Tolerance: ACI 117 Class D.
    e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    b. Remove projections larger than 1/4 inch.
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 Class B.
    e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. Verify all finishes with architectural drawings prior to placement of concrete.

B. Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

C. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

D. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

E. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a hard trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch and 1/16 inch in 2 feet.

F. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

G. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

    a. Floors to Receive Curing Compound:

        1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
        2) Recoat areas subjected to heavy rainfall within three hours after initial application.
        3) Maintain continuity of coating, and repair damage during curing period.
        4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer, unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

3.12 TOLERANCES

A. Conform to ACI 117.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month.
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and as indicated on drawings at formed or keyed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

E. Joint filler installation to company with manufacturer’s printed directions; consult manufacturer as required for specific technical questions and additional required instruction.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Engineer.
2. Remove and replace concrete that cannot be repaired and patched to Engineer’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

    a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

    a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
    b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
2. Testing agency shall immediately report to Architect, Engineer, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.

7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:

1. Notify Architect a minimum of twenty-four (24) hours prior to scheduling concrete pours to allow for a pre-pour inspection. Defective work will be rejected.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143:

a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231 pressure method, for normal-weight concrete.

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C1064:

a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C31:

a. Cast and laboratory cure three sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C39.

   a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days. Retain one set of two specimens in reserve for later testing if required.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi .
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests:

    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Engineer.

       1) Acceptance criteria for concrete strength shall be in accordance with ACI 301, section 1.6.6.3.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.

5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 034500 - ARCHITECTURAL PRECAST CONCRETE WALL PANELS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Contract drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, shall apply to this section.

1.2 SUMMARY

A. This section covers the performance criteria, materials, design, production, and erection of Architectural Precast Concrete Wall Panels for the project. The work performed under this section shall include all labor, materials, equipment, design, engineering, related services, and supervision required for the manufacture and erection of all Architectural Precast Concrete Wall Panel work shown on the contract drawings.

1. Precast Concrete Institute **Category AC** products provided and installed under this specification section shall include:

a. Exterior Architectural Precast Concrete Wall Panels

B. Related sections include the following:

1. Section 033000 “Cast-in-Place Concrete” for installing connection anchors in concrete.
2. Section 051200 “Structural Steel Framing” for furnishing and installing connections attached to structural-steel framing.
3. Section 055000 “Metal Fabrications” for furnishing and installing loose hardware items, kickers, and other miscellaneous steel shapes.
4. Section 071900 “Water Repellents” for water-repellent finish treatments.
5. Section 076220 “Sheet Metal Flashing and Trim” for flashing receivers and reglets.
6. Section 079000 “Building Joint Sealants,” for elastomeric joint sealants and sealant backings.
7. Section 088100 “Pre-Finished Aluminum Curtainwalls, Storefronts, & Glazing Systems” for windows set inside architectural precast concrete unit openings.

8. Section 131250 "Metal Building Systems" for pre-engineered building structures supporting Architectural Precast Concrete Wall Panels.

C. The most current ASTM and ANSI standards for all materials shall govern.

1.3 DELEGATED DESIGN SUBMITTAL

A. **Architectural Precast Concrete Wall Panel system design and calculations shall be performed and prepared by the Architectural Precast Concrete Wall Panel Manufacturer, based on empirical test data, applicable codes and standards, and project specific requirements.**

B. **Design and Structural analysis data and calculations shall be prepared, signed, and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific requirements, design loads, and governing code requirements as described herein and as indicated on the drawings.**

C. **Approval Drawings and "For Construction" Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

D. **Drawings and calculations shall be prepared and stamped by one Professional Engineer, duly licensed in the State of Louisiana, who is responsible for the design.**

E. **Design/Code Requirements: Roofing system shall be designed in accordance with the requirements of the following Codes, Standards, and other criteria:**
   1. **IBC-2021**
   2. **ASCE-7-16 – Design Requirements for Components & Cladding, and wind uplift requirements for based on the project's specific geographical location and topographical characteristics.**
   3. **Risk Category: "III"**
   4. **Exposure Category: "C"**
   5. **Design Wind Speed: 145 MPH, 3-second gust wind speed**

F. **Structural Performance: Design and Provide Architectural Precast Concrete Wall Panel units and connections capable of withstanding the design loads and conditions indicated here, and in the Drawings.**

1. Dead loads: **Panel Weight (no additional or special Dead Loads applied on precast concrete wall panels).**
2. Live loads: **As Required by applicable codes (no additional or special Live Loads applied on precast concrete wall panels.)**
3. Wind loads: **<Insert applicable wind loads or wind-loading criteria, positive and negative, for various parts of the building as required by applicable building code or ASCE/SEI 7 *Minimum Design Loads for Buildings and Other Structures*, including basic wind speed, importance factor, exposure category, and pressure coefficient.>**
4. **Seismic loads: As Required by applicable codes.**
5. **Blast loads: NOT APPLICABLE.**
6. **Project-specific loads: No additional or special loading required.**
7. **Design precast concrete units and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage, and creep of primary building structure, and other building movements as follows:**
8. **Overall building drift: Metal Building Horiz. Deflection: 1/480 (max.)**
9. **Inter-story building drift: NOT APPLICABLE**
10. **Upward / downward movement: 1/4 in.(6 mm)**

11. Thermal movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of **[90°F (44°C)]**

12. Fire resistance rating: Select material and minimum thicknesses to provide [1-hour] [2-hour] fire rating – **NOT REQUIRED**.

13. Window washing system: Design precast concrete units supporting window washing system indicated to resist forces transmitted from window washing equipment – **NOT REQUIRED**.

14. Vehicular impact loads: Design spandrel beams acting as vehicular barriers to resist the design load applied horizontally in any direction at the required height off finish floor, with anchorages or attachments capable of transferring this load to the structure. **– NOT REQUIRED**.

15. Blast loads: - **NOT REQUIRED**.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, retain quality control records and certificates of compliance for five years after completion of structure.

B. Design Mixtures: For each precast concrete mixture, include results of compressive strength and water-absorption tests.

C. Shop Drawings and Erection Drawings:

1. Provide drawings detailing the fabrication and installation of Architectural precast concrete Wall Panel units.
2. Indicate plan views and elevations showing unit locations and dimensions, erection sequences, and bracing plans for special conditions.
3. Indicate location of each architectural precast concrete unit by same identification mark placed on unit.
4. Indicate locations, plan views, elevations, dimensions, shapes, and cross sections of each unit.
5. Coordinate and indicate openings and inserts required by other trades.
6. Indicate relationships of architectural precast concrete units to adjacent materials.
7. Indicate aesthetic intent, including joints, drips, chamfers, rustications, or reveals, and extent and location of each surface finish.
8. Indicate details at building corners.
9. Indicate separate face and backup mixture locations and thicknesses (if applicable).
10. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
11. Indicate embedded plates in building foundations and panels.
12. Indicate connection plates / angles utilized to permanently connect panels to slab, panels to adjacent panels, and panels to building structure.
13. Indicate welded connections, using American Welding Society (AWS) standard symbols. Show the size, length, and type of each weld.
14. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
15. Indicate design modifications:

a. If design modifications are proposed to meet performance requirements, field conditions, or erection sequencing, notify the Architect in advance of submitting shop / erection drawings and design calculations. All proposed changes shall be

reviewed and approved by the Architect, prior to being incorporated into the submittal.

b. Proposed modifications shall maintain the general design concept, layout, and appearance of that originally indicated in the Contract Documents. Proposed modifications of details of materials, shall not adversely affect the aesthetics, appearance, durability, or strength of the finished installation.

16. **Provide comprehensive engineering design, signed and sealed by a qualified Professional Engineer, duly licensed in the State Of Louisiana, and regularly engaged in the design and detailing of Architectural Precast Concrete Wall Panel systems and connections, and responsible for the design.**

17. **The Architectural Precast Concrete Wall Panel design and details shall include the embeds in and attachments to the building foundation, and to the metal building frame.**

18. **The Architectural Precast Concrete Wall Panel shall indicate governing panel types, connections, concrete cover, and reinforcement types, including special reinforcement if required, and indicate the location, type, magnitude, and direction of loads imposed on the building's structural frame by the architectural precast concrete.**

D. Samples: For verification of design intent, provide design reference samples approximately 12 × 12 × 2 in. (300 × 300 × 50 mm) in size that are representative of the finish(es), color(s), and texture(s) of all exposed surfaces of Architectural Precast Concrete Wall Panel units.

A. When a precast concrete unit's back face is required to be exposed, include samples illustrating workmanship, color, and texture of the back face as well as the facing concrete.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Products specified herein shall be fabricated to **PCI Category AC**. Provide documentation from precast concrete fabricator that they are a PCI-certified plant for Category AC, AB, or AA, and in current good standing at the time of project bid.

2. Provide documentation from precast concrete erector that they are a PCI-certified erector for Category A at the time of project bid.

B. Welding Certificates: Provide copies of certificates for welding procedure specifications (WPS), and welding personnel certification.

C. Material Test Reports for Aggregates: Provide material test certification reports from an accredited testing agency that documents and interprets test results, and indicates compliance with project requirements.

D. Material Certificates: Provide certificates signed by manufacturers for the following items:

1. Cementitious materials.
2. Reinforcing materials.
3. Admixtures.
4. Bearing pads.
5. Structural-steel shapes and hollow structural-steel sections.
6. Insulation (if applicable).
7. Clay product units and accessories (if applicable).
8. Other components specified in the Contract Documents with applicable standards.

E. Field quality control test and inspection reports.

1.7 QUALITY ASSURANCE

A. Design Standards: Comply with the American Concrete Institute's *Building Code Requirements for Structural Concrete and Commentary* ACI 318 (ACI 318M) and design recommendations of PCI MNL-120, *PCI Design Handbook: Precast and Prestressed Concrete*, applicable to the types of architectural precast concrete units indicated.

B. Quality Control Standards: For manufacturing procedures and testing requirements, quality control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL-117, *Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products*, and PCI MNL-135, *Tolerance Manual for Precast and Prestressed Concrete Construction*.

C. Fabricator Qualifications: Architectural Precast Concrete Wall Panel fabricator shall be experienced in producing architectural precast concrete wall units similar to those indicated for this project, shall have a record of successful in-service performance, and comply with the following requirements:

1. Fabricator shall participate in the Precast Concrete Institute / PCI Plant Certification program at the time of bidding and is designated a PCI-certified plant for **Category AC, AB, or AA**.
2. Have sufficient production capacity to produce required units without delaying the project.
3. **Assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of shop (erection) drawings and comprehensive engineering analysis by a qualified professional engineer, including attachments to and plates embedded in the building foundation, attachments to the metal building frame.**
4. **Professional engineer qualifications: A professional engineer who is licensed in the jurisdiction where the project is located and who is experienced in providing engineering services of the kind indicated.**

~~D. Erector Qualifications: A precast concrete erector whose erecting organization and all erecting crews are certified and designated, prior to beginning work at project site, by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load bearing members.~~ – **NOT REQUIRED**

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, *Structural Welding Code - Steel*; AWS D1.4/D1.4M, *Structural Welding Code - Reinforcing Steel*; and AWS D1.6/D1.6M, *Structural Welding Code - Stainless*.

F. Fire Resistance: Where indicated, provide architectural precast concrete units whose fire resistance satisfies the fire resistance ratings of the contract documents; units must also meet the prescriptive fire resistance requirements of the governing code or be calculated according to **[PCI 124, *Specification for Fire Resistance of Precast/Prestressed Concrete*] [ACI 216.1/TMS 216.1*, Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies*]**, and be acceptable to authorities having jurisdiction -**NOT APPLICABLE**

~~G. Sample Panels: After initial sample approval and before fabricating architectural precast concrete units, produce a minimum of **[two] <Insert number>** sample panels (not less than **[16 ft² (1.5 m²)] <Insert dimensions>**) in area for review by Architect. Incorporate full-scale details of architectural features, finishes, and transitions in sample panels.~~ – **NOT REQUIRED**.

~~1. Locate panels where indicated in the contract document or, if not indicated, as directed by Architect.~~

2. Damage part of an exposed-face surface for each finish, color, and texture and then repair the damaged areas to demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
3. When unformed (backside) of panel is exposed to final view, damage and then repair part of the exposed unformed face surface for each finish, color, and texture to demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
4. After acceptance of repair technique, maintain two sample panels in an undisturbed condition—one at the fabricator's plant and one at the project site—as a standard for judging the completed work.
5. Demolish and remove sample panels when directed by Architect.

NOT REQUIRED.

H. Range Sample Panels:

1. After sample panel approval and before fabricating architectural precast concrete units, produce a minimum of **[three][five] <Insert number>** samples, approximately **[16 ft² (1.5 m²)] <Insert dimensions>** in area, representing the anticipated range of each color and texture on project's units.
2. When unformed (back) side of panel is exposed to final view, produce a range of unformed (back) side samples to represent anticipated range of each color and texture on project's units.
3. Maintain range samples at fabricator's plant for reference regarding color and texture acceptability.

NOT REQUIRED.

I. Mockup Panels: After sample panel **[and range sample]** approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under sample submittals, demonstrate aesthetic effects, and set quality standards for materials and execution. Ensure that mockups are representative of the finished work, including all exposed-to-view finish faces of precast concrete elements. Mockups shall include **[aluminum framing, glass, sealants] <insert construction materials required to be included in mockup>** and architectural precast concrete complete with anchors, connections, flashings, and joint fillers as accepted on final shop (erection) drawings. Build mockups to comply with the following requirements, using materials indicated for the completed work: - **NOT REQUIRED.**

1. Build mockups in the location and of the size indicated in contract documents or, if not indicated, as directed by Architect.
2. Notify Architect in advance of dates and times when mockups will be constructed.

~~3. Obtain Architect's approval of mockups before fabricating precast concrete units.~~

~~4. During construction, maintain mockups in an undisturbed condition as a standard for judging completed work.~~

~~5. Demolish and remove mockups when directed by Architect.~~

NOT REQUIRED.

J. Production Mock-Up: Install (2) panels on site, at wall or corner, in permanent location, and with anchors, attachments, and welds, in accordance with the approved design, for review and approval by the Architect and Owner, prior to proceeding.

1. Approved production mock-ups may become part of the completed work if they are approved, and undamaged at the time of substantial completion.
2. Approval of mockups does not constitute approval of deviations from Contract documents unless such deviations are specifically approved by Architect in writing.

~~K. Preconstruction Testing Mockup: Provide a full-size mockup of architectural precast concrete indicated on contract drawings for preconstruction testing. Refer to Division **[01][08] <Insert Division number>**, Section "**<Insert Section title>**," for preconstruction testing requirements.~~ – **NOT REQUIRED**.

~~1. Build preconstruction testing mockup as indicated on contract drawings, including all exposed-to-view finish faces of precast concrete elements; also include **[aluminum framing, glass, sealants], < insert construction materials required to be included in mockup >** and architectural precast concrete complete with anchors, connections, flashings, and joint fillers.~~

~~2. Deliver and install preconstruction testing mockup at testing agency's facility.~~

NOT REQUIRED.

L. Preinstallation Conference: Conduct pre-construction conference at the Project Site, to comply with requirements in Section 013100, "Project Management and Coordination."

1.8 HANDLING, STORAGE, AND DELIVERY

A. Store units with adequate dunnage and bracing, and protect units to prevent contact with ground, prevent staining, and prevent cracking, distortion, warping, or other physical damage.

B. Place stored units so identification marks are clearly visible, and units can be inspected.
C. Handle and transport units in a manner that avoids excessive stresses capable of causing cracking or other damage.
D. Lift and support units only at designated points indicated on shop (erection) drawings.
E. Deliver architectural precast concrete units in such quantities and at such times to ensure compliance with the agreed-upon project schedule and setting sequence, and to limit unloading units temporarily on the ground or other rehandling.
F. Support units during shipment on nonstaining, shock-absorbing material.

1.9 SEQUENCING

A. Contractor shall coordinate items to be placed on or in the foundation and metal building structure to allow placement and anchoring of precast concrete units.
B. Contractor shall coordinate the material deliveries, storage, and subcontractors, as required by the project and available lay-down area.
C. To avoid work delays, the Contractor shall ensure that the types and quantities of hardware and fabricated items to be cast into precast concrete units and to be cast into the building foundation, or provided for use by other trades are indicated, detailed, and installed in a timely manner.
D. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.
E. Contractor shall verify that all embedded items are set and properly placed in building foundation, prior to pouring concrete.
F. Contractor shall coordinate embeds and anchors in precast concrete wall panels correspond to metal building structural supports indicated in the drawings.

PART 2 – PRODUCTS

2.1 FABRICATORS

A. Fabricators: Products designated herein as **PCI Category AC** products are provided by a firm that participates in the PCI Plant Certification program at the time of bidding and is designated a PCI-certified plant for Category AC, AB or AA.

2.2 MOLD MATERIALS

A. Molds: Utilize rigid, dimensionally stable, nonabsorptive, and warp- and buckle-free materials that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.

B. Form-release agent: Commercially produced form-release agent that will not bond with, stain, or affect hardening of precast concrete surfaces, and that will not impair specified surface finishes applied in the field, or joint treatments of precast concrete.

C. Form Liners: Units of face design, texture, arrangement, and configuration [indicated] [to match those used for precast concrete design reference sample] – **NOT APPLICABLE**.

1. Provide solid backing and form supports to ensure that formliners remain in place during concrete placement.
2. Use a manufacturer-recommended form-release agent that will not bond with, stain, or adversely affect hardening of precast concrete surfaces, and that will not impair subsequent surface or joint treatments of precast concrete.

D. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete to depth of reveal specified – **NOT APPLICABLE.**

2.3 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.

B. Steel Bar Mats: ASTM A184/A184M, fabricated from [ASTM A615/A615M, Grade 60 (Grade 420)] [ASTM A706/A706M] deformed bars, assembled with clips.

C. Plain-Steel Welded Wire Reinforcement: ASTM A1064/A1064M, fabricated from [as-drawn] [galvanized and chromate wash–treated] steel wire into flat sheets.

D. Deformed Steel Welded Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

E. Recycled Content of Steel Products: Track the average recycled content of steel products used on project to ensure that the sum of postconsumer recycled steel meets the requirements of the <insert specified rating system requirements> - **NOT REQUIRED.**

F. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M, deformed – **NOT REQUIRED**.

G. Epoxy-Coated Reinforcing Bars: [ASTM A615/A615M, Grade 60 (Grade 420)] [ASTM A706/A706M] deformed bars, [ASTM A775/A775M] [ASTM A934/A 934M] epoxy coated - **NOT REQUIRED**.

H. Galvanized Reinforcing Bars: [ASTM A615/A615M, Grade 60 (Grade 420)] [ASTM A706/A706M] deformed bars, ASTM A767/A767M, Class II zinc-coated, hot-dip galvanized and chromate wash treated after fabrication and bending – **NOT REQUIRED**.

I. Epoxy Coated-Steel Welded Wire Reinforcement: ASTM A884/A884M, Class A coated, [plain] [deformed], flat sheet, Type [1 bendable] [2 non-bendable] coating – **NOT REQUIRED**.

J. Supports: Suspend reinforcement from back of mold. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place may only be used if they are not visible in the finished face. Provide sufficient coverage for any ferrous reinforcement to ensure that rusting or staining at finished surfaces is prevented.

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or III.

1. For surfaces exposed to view in finished structure, use **[gray]** ~~and/or [white]~~ portland cement, of same type, brand, and mill source throughout the precast concrete production.
   Note: White cement has greater color consistency than gray cement. Blending white and gray cement will improve the color uniformity of gray cement. For darker colors, the variations of gray cement have less effect on the final color hue.
   Note: If face mixture uses white cement but gray cement will be permitted in backup mixture, note accordingly.

2. Standard gray portland cement may be used for nonexposed backup concrete.

B. Supplementary Cementitious Materials.

Consult with local fabricator prior to selecting mineral or cementitious materials from four subparagraphs below. These materials may affect concrete appearance, set times, and cost. If architectural face appearance is an important factor, it is recommended that fly ash and gray silica fume not be permitted for exposed exterior surfaces. White supplementary cementitious materials (SCMs), including metakaolin and white silica fume, are available.

1. Fly ash: ASTM C618, Class C or F, with maximum loss on ignition of 3%.
2. ~~Metakaolin: ASTM C618, Class N~~ – **NOT ALLOWED**
3. ~~Silica fume (white): ASTM C1240, with optional chemical and physical requirements~~. – **NOT ALLOWED**
4. ~~Ground granulated blast furnace slag: ASTM C989, Grade 100 or 120~~ – **NOT ALLOWED**

C. Normal weight Aggregates: Except as modified by PCI MNL-117, use aggregates that comply with ASTM C33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for project.

1. Face-mixture coarse aggregates: Hard, and durable aggregates, free of material that reacts with cement or causes staining and matches selected sample finish(es).

   a. Gradation: **[Uniformly graded]** ~~[Gap-graded] [To match design reference sample]~~.

2. Face-mixture fine aggregates: Natural or manufactured sand of a material compatible with coarse aggregate and matches selected sample finish(es).

3. Backup concrete aggregates: ASTM C33 or ASTM C330.

D. Lightweight Aggregates: Meets ASTM C330 with absorption less than 11%, except as modified by PCI MNL-117.
Note: If face mixture will be exposed to weather, use of lightweight aggregates in the mixture is not recommended in cold or humid climates unless the aggregates' performance has been verified by tests or records of previous satisfactory usage in similar environments. If normal weight aggregates are used in face mixture, lightweight aggregates in the backup mixture are not recommended due to panel-bowing potential.

E. Coloring Admixture: ASTM C979, synthetic or natural mineral-oxide pigments that are temperature stable and nonfading – **NOT REQUIRED**.
F. Water: Potable; free from or containing only trace amounts of deleterious material that may affect color stability, setting, or strength of concrete; and complying with chemical limits of PCI MNL-117.
G. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures; certified by manufacturer to not contain any calcium chloride or more than 0.15% chloride ions or other salts by weight of admixture.

1. Water-reducing admixture: ASTM C494/C494M, Type A.
2. Retarding admixture: ASTM C494/C494M, Type B.
3. Water-reducing and retarding admixture: ASTM C494/C494M, Type D.
4. Water-reducing and accelerating admixture: ASTM C494/C494M, Type E.
5. High-range water-reducing admixture: ASTM C494/C494M, Type F.
6. High-range water-reducing and retarding admixture: ASTM C494/C494M, Type G.
7. Plasticizing admixture for flowable concrete: ASTM C1017/C1017M.
8. Corrosion-inhibiting admixture: ASTM C1582/C1582M.

2.6 STEEL CONNECTION MATERIALS

A. Carbon Steel Shapes and Plates: ASTM A36/A36M.
B. Carbon Steel Headed Studs: ASTM A108, Grades 1010 through 1020, cold finished, AWS D1.1/ D1.1 M, Type A or B, with arc shields and with the minimum mechanical properties specified in PCI MNL-117, Table 3.2.3.
C. Carbon Steel Plate: ASTM A283/A283M, Grade C.
D. Malleable Iron Castings: ASTM A47/A47M, Grade 32510 or 35028.
E. Carbon Steel Castings: ASTM A27/A27M, Grade 60-30 (Grade 415-205).
F. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M.
G. Carbon Steel Structural Tubing: ASTM A500/A500M, Grade B or C.
H. Wrought Carbon Steel Bars: ASTM A675/A675M, Grade 65 (Grade 450).
I. Deformed-Steel Wire or Bar Anchors: ASTM A496/A496 M or ASTM A706/A706M.
J. Carbon Steel Bolts and Studs: ASTM A307, Grade A or C (ASTM F568M, Property Class 4.6) carbon steel, hex-head bolts and studs; carbon steel nuts (ASTM A563/A563M, Grade A); and flat, unhardened steel washers, ASTM F844.

K. High-Strength Bolts and Nuts: ASTM A193/A198M, Grade B5 or B7, ASTM A325/A325M, or ASTM A490/A490M, Type 1, heavy hex steel structural bolts, heavy hex carbon steel nuts, (ASTM A563/A563M), and hardened carbon steel washers (ASTM F436/F436M).
Note: High-strength bolts are used for friction-type connections between steel members and are not recommended between steel and concrete because concrete creep and crushing of concrete during bolt tightening reduces the effectiveness of the connection.
Note: ASTM A490/A490M bolts, if specified should not be galvanized.

L. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in the Society for Protective Coatings SSPC-SP 3 standard *Power Tool Cleaning*, and shop-apply [lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in Master Painters Institute's MPI 79] [SSPC-Paint 25] according to SSPC-PA 1 *Shop, Field, and Maintenance Painting of Steel*.

M. Hot-Dipped-Galvanized-Coated Finish: For steel items at exterior side of exterior walls and items indicated for galvanizing, apply zinc coating by [hot-dip process according to ASTM A123/A123M, after fabrication, ASTM A153/A153M, or ASTM F2329 as applicable] [electrodeposition according to ASTM B633, SC 3, Type 1 or 2, and for bolts, ASTM F1941/F1941M].

1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03% or to between 0.15% and 0.25%, or limit sum of silicon content and 2.5 times phosphorous content to 0.09%.
2. Galvanizing repair paint: Zinc paint with dry film containing not less than 94% zinc dust by weight and complying with DOD-P-21035B or SSPC-Paint 20. Comply with manufacturer's requirements for surface preparation.

2.7 STAINLESS STEEL CONNECTION MATERIALS

A. Where indicated for additional resistance to staining or corrosion in high-moisture or corrosive environments.
B. Stainless Steel Plate: ASTM A666, Type 304, Type 316, or Type 201 of grade suitable for application.
C. Stainless Steel Bolts and Studs: ASTM F593, alloy 304, 316, or 410, hex-head bolts and studs; stainless steel nuts; and flat, stainless-steel washers.

1. Lubricate threaded parts of stainless-steel bolts with an anti-seize thread lubricant during assembly.

D. Stainless Steel Headed Studs: ASTM A276 with the minimum mechanical properties for studs specified in PCI MNL-117, Table 3.2.3.

2.8 BEARING PADS AND OTHER ACCESSORIES

A. Provide one of the following bearing pads for architectural precast concrete units **[as recommended by precast concrete fabricator for application]**:

1. Elastomeric pads: AASHTO M251, plain, vulcanized, 100% polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet. Surface hardness of 50 to 70 Shore A durometer according to ASTM D2240; minimum tensile strength 2250 psi (15.5 MPa) per ASTM D412.
2. Random-oriented, fiber-reinforced elastomeric pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 Shore A durometer according to ASTM D2240. Capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of the pad. Test one specimen for each 200 pads used in project.
3. Cotton-duck-fabric-reinforced elastomeric pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer. Surface hardness of 80 to 100 Shore A durometer according to ASTM D2240. Conforming to Division II, Section 18.10.2 of the American Association of State Highway and Transportation Officials' *AASHTO LRFD Bridge Design Specifications*, or military specification MIL-C-882E.
4. Frictionless pads: Tetrafluoroethylene (Teflon), glass-fiber-reinforced pads bonded to stainless or mild-steel plates, or random-oriented, fiber-reinforced elastomeric pads, of type required for in-service stress.
5. High-density plastic: Multimonomer, nonleaching plastic strip capable of supporting loads with no visible overall expansion.

B. Reglets: Provide [PVC extrusions reglets and flashing] [Stainless steel, Type 304 reglets and flashing] [Copper reglets and flashing] [Reglets and flashing as specified in Division 076200 Section "Sheet Metal Flashing and Trim"], felt- or fiber-filled or face opening of slots covered.

C. Erection Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

D. Welding Electrodes: Comply with AWS standards for steel type and/or alloy being welded.

2.9 GROUT MATERIALS

A. Sand-Cement Grout: Portland cement, ASTM C150, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2½ to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content of grout shall be less than 0.06% chloride ion by weight of cement when tested in accordance with ASTM C1218/C1218M.

B. Nonmetallic, Nonshrink Grout: Premixed, prepackaged nonferrous aggregate, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing admixtures; complying with ASTM C1107, Grade A, for dry-pack, and Grades B and C for flowable grout; and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content of grout shall be less than 0.06% chloride ion by weight of cement when tested in accordance with ASTM C1218/C 1218M.

C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin complying with ASTM C881/C881M, of type, grade, and class to suit requirements.

2.12 INSULATED PANEL ACCESSORIES

Note: Chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and other ozone-depleting substances should not be used or released during manufacture of insulation.
Note: *Type IV is the industry standard for extruded-polystyrene board insulation in most precast concrete applications—confirm with a local PCI producer.*

A. Expanded-Polystyrene (EPS) Board Insulation: ASTM C578, Type [XI, 0.70 lb/ft^3 (12 kg/m^3)] [I, 0.90 lb/ft^3 (15 kg/m^3)] [VIII, 1.15 lb/ft^3 (18 kg/m^3)] [II, 1.35 lb/ft^3 (22 kg/m^3)] [IX, 1.80 lb/ft^3 (29 kg/m^3)]; square edged; with thickness of <Insert dimension> – **NOT REQUIRED**.

B. Extruded-Polystyrene (XPS) Board Insulation: ASTM C578, Type [X, 1.30 lb/ft^3 (21 kg/m^3)] [IV, 1.55 lb/ft^3 (25 kg/m^3)] [VI, 1.80 lb/ft^3 (29 kg/m^3)] [VII, 2.20 lb/ft^3 (35 kg/m^3)] [V, 3.00 lb/ft^3 (48 kg/m^3)]; square edged; with thickness of <Insert dimension> – **NOT REQUIRED**.

C. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation complying with ASTM C591, Grade 1, or ASTM C1289 Type [I, 1.80 lb/ft^3 (29 kg/m^3)] [II, 2.50 lb/ft^3 (40 kg/m^3)] [(III, 3.00 lb/ft^3 (48 kg/m^3)]; square edged; faced with <insert facing material> with thickness of <Insert dimension> – **NOT REQUIRED**.

D. Wythe Connectors: [Glass fiber in vinyl-ester polymer], [polypropylene pin], [stainless steel pin], [bent galvanized reinforcing bars] [galvanized welded wire trusses], [galvanized bent wire connectors] [epoxy-coated carbon fiber grid], [fiberglass truss] manufactured to connect wythes of precast concrete panels – **NOT REQUIRED**.

E. Producer shall provide holes or other penetrations if required by connector system chosen.

2.13 CONCRETE MIXTURES

A. Prepare design mixtures to match Architect's sample or for each type of precast concrete required.

1. Fly ash use is permissible for use, up to 15% maximum replacement of portland cement by weight;
2. Ground granulated blast furnace slag (GGFBS) – **NOT ALLOWED.**
3. Metakaolin – **NOT ALLOWED.**
4. White silica fume – **NOT ALLOWED.**

B. Design mixtures shall be prepared by either a qualified independent testing agency, qualified ready-mix concrete plant, or qualified precast concrete plant personnel, at architectural precast concrete fabricator's option.

C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL-117 when tested in accordance with ASTM C1218/C1218M.

D. Normal weight Concrete Face and Backup Mixtures: If architectural precast concrete units are manufactured with a separate "architectural" face mixture and a "structural" backup mixture, face and backup mixtures shall have similar shrinkage and thermal coefficients of expansion, similar water–cementitious materials ratios, and cement-aggregate ratios to limit bowing or warping.

Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1 *Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete*, with materials to be used on project, to provide normal weight concrete with the following properties:

1. Compressive strength at 28 days: 5000 psi (34.5 MPa) minimum, or greater, if required by engineering design.
2. Release strength: As required by design.
3. Water–cementitious materials ratio: 0.45 Maximum.

E. Water Absorption: 6% by weight or 14% by volume, tested according to ASTM C642, except for boiling requirement.

Note: Water absorption indicates susceptibility to weather staining. The limit of 6% by weight, is suitable for average exposures. Different parts of a single panel cannot be produced with different absorptions. Before specifying lower water absorption, verify that fabricator can produce units with lower water absorption because special consolidation techniques to increase concrete density are required.

F. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2 *Standard Practice for Selecting Proportions for Structural Lightweight Concrete*, with materials to be used on project, to provide lightweight concrete with the following properties:

Note: Lightweight backup mixtures must be compatible with normal weight face mixtures to minimize bowing or warping. If normal weight aggregates are used in face mixture, lightweight aggregates in the backup mixture are not recommended due to panel bowing potential. Compatibility shall be verified by fabricator. Coordinate with selection of normal weight face mixture option above.

1. Compressive strength at 28 days: 5000 psi (34.5 MPa) minimum.
2. Release strength: As required by design.
3. Unit weight: Calculated equilibrium unit weight of 115 lb/ft^3 (1842 kg/m^3), where variations exceed ±5 lb/ft^3 (±80 kg/m^3) adjust to ±3 lb/ft^3 (±48 kg/m^3), according to ASTM C567.

G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL-117.
H. When other admixtures are included in design mixtures, add them to concrete according to manufacturer's written instructions.

2.14 MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete placement and vibration operations and temperature changes, and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of formliners during concrete placement. Coat formliner with form-release agent.

B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated in contract documents, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and corner treatment: Uniformly **[chamfered]** ~~[radiused]~~.

2.17 FABRICATION MATERIALS

A. Cast-In Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position loose hardware and secure in place during casting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

B. Architectural Precast Concrete Wall Panel Suppler shall engineer and provide all embedded plates at building foundation, to be compatible with anchoring angles and plates.

1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, *Recommended Practices for Stud Welding*.

C. Furnish loose hardware items, including steel plates, clip angles, seat angles, anchors, dowels, clamps, hangers, and other hardware shapes, for securing architectural precast concrete units to supporting and adjacent construction.
D. Cast in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on contract drawings.
E. Cast in openings larger than 6 in. (250 mm) in any dimension.

1. Do not drill or cut openings or reinforcement without precast concrete Design Engineer's approval.

B. Reinforcement: Comply with recommendations in PCI MNL-117 for fabrication, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified in ASTM A775/A775M, repair damage with patching material compatible with coating material and epoxy-coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Completely conceal plastic chair support devices to prevent exposure on finished surfaces.
3. Place reinforcing steel and prestressing tendon to maintain at least ¾ in. (19 mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1½ in. (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing, and wire tie laps. Offset laps of adjoining widths to prevent continuous laps in either direction.

F. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses, and specified in-place loads, whichever govern.

G. Comply with requirements in PCI MNL-117 and requirements in this section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

H. Place face mixture to a minimum thickness after consolidation of the greater of 1 in. (25 mm) or 1.5 times the nominal maximum aggregate size, but not less than the minimum reinforcing cover as indicated on contract drawings.

1. Use a single design mixture for those units in which more than one major face (edge) is exposed.
2. Where only one face of unit is exposed, at the fabricator's option, either of the following mixture design/casting techniques may be used:

    a. A single design mixture throughout the entire thickness of panel.
    b. Separate mixtures for face and backup concrete, using cement and aggregates for each type, as appropriate, for consecutive placement in the mold. Use cement and aggregate specified for face mixture. Use cement and aggregate for backup mixture complying with specified criteria or as selected by the fabricator.

I. Place concrete in a continuous operation to prevent pour lines, aggregate separation, cold joints, or planes of weakness from forming in precast concrete units.

1. Place backup concrete to ensure bond with face mixture concrete.

J. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL-117.

1. Place self-consolidating concrete without vibration in accordance with PCI TR-6 *Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete*. If face and backup concrete mixtures are used, ensure adequate bond between concrete mixtures.

K. Comply with PCI MNL-117 procedures for hot- and cold-weather concrete placement.

L. Identify pickup points of architectural precast concrete units and orientation in structure on shop (erection) drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL-117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until the compressive strength reaches the design stripping strength.

N. Repair damaged architectural precast concrete units to meet acceptability requirements in PCI MNL-117 and Architect's approval.

2.19 PRODUCT FABRICATION TOLERANCES

A. Fabricate architectural precast concrete units to the dimensional tolerances, shapes, lines, and features indicated, and position the cast-in items so each finished unit complies with PCI MNL-117, PCI MNL-135, and product tolerances as required by the Certification Category AC.

B. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated, so each finished unit complies with the following product tolerances, which reflect Certification Category AC tolerances.

1. Overall height and width of units, measured as follows:

    a. 10 ft (3 m) or under: ±⅛ in. (±3 mm).
    b. 10 to 20 ft (3 to 6 m): +⅛ in. (+3 mm), –3/16 in. (–5 mm).
    c. 20 to 40 ft (6 to 12 m): ±¼ in. (±6 mm).
    d. Greater than 40 ft (12 m): ±1/16 in. per 10 ft (±1.5 mm per 3 m).

2. Total thickness or flange thickness for edges ±¼ in. (±6 mm), -1/8 in. (-3 mm).
3. Rib width: ±⅛ in. (±3 mm).
4. Rib to edge of flange: ±⅛ in. (±3 mm).
5. Distance between ribs: ±⅛ in. (±3 mm).
6. Variation from square or designated skew (difference in length of the two diagonal measurements — applies to panel and major openings in panel): Greater of ±⅛ in. per 72 in. (±3 mm per 2 m) and ±½ in. (13 mm).
7. Length and width of blockouts and openings within one unit ±¼ in. (±6 mm).
8. Location and dimensions of blockouts hidden from view and used for HVAC and utility penetrations: ±¾ in. (±19 mm).
9. Dimensions of haunches: ±¼ in. (±6 mm).
10. Haunch bearing surface deviation from specified plane: ±⅛ in. (±3 mm).
11. Difference in relative position of adjacent haunch bearing surfaces from specified relative position: ±¼ in. (±6 mm).
12. Bowing: $\pm L/360$, maximum 1 in. (25 mm).
13. Local smoothness: ¼ in. per 10 ft (6 mm per 3 m).
14. Warping: 1/16 in. per 12 in. (1.5 mm per 0.3 m) of distance from the nearest adjacent corner.
15. Tipping and flushness of plates: ±¼ in. (±6 mm).
16. Dimensions of architectural features and rustications: ±⅛ in. (±3 mm).
17. Location of rustication joints: ±⅛ in. (±3 mm).

C. Position Tolerances: For cast-in items measured from datum line location, as indicated on shop (erection) drawings.

1. Weld plates: ±1 in. (±25 mm).
2. Inserts: ±½ in. (±13 mm).
3. Handling devices: ±3 in. (±75 mm).
4. Reinforcing steel and welded wire reinforcement: ±¼ in. (±6 mm) where position has structural implications or affects concrete cover; otherwise, ±½ in. (±13 mm).
5. Reinforcing steel extending out of member: ±½ in. (±13 mm) of plan dimensions.

6. Prestressing reinforcement: ±¼ in. (±6 mm), perpendicular to panel; ±1 in. (±25 mm), parallel to panel.
7. Location of flashing reglets: ±¼ in. (±6 mm).
8. Location of flashing reglets at edge of panel: ±⅛ in. (±3 mm).
9. Reglets for glazing gaskets: ±⅛ in. (±3 mm).
10. Electrical outlets, hose bibs: ±½ in. (±13 mm).
11. Location of bearing surface from end of member: ±¼ in. (±6 mm).
12. Allowable rotation of plate, channel inserts, electrical boxes: 2-degree rotation or ¼ in. (6 mm) maximum measured at perimeter of insert.
13. Position of sleeve: ±½ in. (±13 mm).
14. Location of window washer track or buttons: ±⅛ in. (±3 mm).

2.20 FINISHES

A. Exposed panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform and straight. Finish exposed-face surfaces of architectural precast concrete units to match approved ~~[design reference sample]~~ **[sample panels]** ~~[mockups]~~ and as follows:

1. As-cast surface finish: Provide surfaces to match accepted sample or mockup units for acceptable surface air voids, sand streaks, and honeycombs. **Surface shall have fine texture, suitable for application of direct applied synthetic stucco finish system, as specified elsewhere.**
2. ~~Abrasive-blast finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to match accepted sample or mockup units.~~
3. ~~Acid-etched finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to match accepted sample or mockup units. Protect hardware, connections, and insulation from acid attack.~~
4. ~~Exposed aggregate finish: Use chemical retarding agents applied to molds, and washing and brushing procedures, to expose aggregate and surrounding matrix surfaces after form removal to match accepted sample or mockup units.~~
5. ~~Textured-surface finish: Impart texture by formliners or inserts to match accepted sample or mockup units for acceptable surface air voids, sand streaks, and honeycombs, with uniform color and texture.~~
6. ~~Thin brick facings: Refer to "Thin Brick Facings" article.~~
7. ~~Polished finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures, to match accepted sample or mockup units.~~

~~8. Bush hammer finish: Use power or hand tools to remove matrix and fracture coarse aggregates to match accepted sample or mockup units.~~

~~9. Honed finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures, to match accepted sample or mockup units.~~

~~13. Sand-embedment finish: Use selected stones placed in a sand bed in bottom of mold, with sand removed after curing, to match accepted sample or mockup units.~~

B. Finish exposed surfaces of architectural precast concrete units to match face-surface finish or approved mockup.

C. Finish exposed back (non-formed) surfaces of architectural precast concrete units to match face-surface color with smooth, steel-trowel finish.

D. Finish unexposed surfaces of architectural precast concrete units with as-cast finish.

E. Finish unexposed **[top in form] [back]** surfaces of architectural precast concrete units to achieve **[light-broom] [stippled] [float] [steel-trowel]** finish.

2.21 SOURCE QUALITY CONTROL

A. Quality Control Testing: Test and inspect precast concrete according to PCI MNL-117 and PCI MNL-135 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, *Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete*, and ASTM C1611/C1611M, ASTM C1712, ASTM C1610/1610M, and ASTM C1621/C1621M.

Retain first paragraph and subparagraph below if owner provided testing is required. PCI certification is normally acceptable to authorities having jurisdiction without further plant quality control monitoring or owner provided third-party testing.

B. In addition to PCI certification, Owner reserves the right to employ an accredited independent testing agency to evaluate architectural precast concrete fabricator's quality control and testing methods.

1. Should Owner so choose, allow Owner's testing agency access to material storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.

C. Provide copies of Concrete Strength Test Reports to Architect for review.

D. Strength of precast concrete units shall be considered deficient if units fail to comply with ACI 318 (ACI 318M) concrete strength requirements.

E. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, fabricator shall employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42/C42M and ACI 318 (ACI 318M).

1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
2. Cores shall be tested in an air-dry condition.
3. Strength of concrete for each series of three cores shall be considered satisfactory if the average compressive strength is equal to or greater than the specified 28-day design compressive strength and no single core is less than 90% of the specified 28-day design compressive strength.
4. Test results shall be reported in writing on the same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:

    a. Project identification name and number.
    b. Date when tests were performed.
    c. Name of precast concrete fabricator.
    d. Name of concrete testing agency.
    e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

F. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill them with precast concrete mixture that has no coarse aggregate, with exposed finish to match adjacent precast concrete surfaces.

G. Acceptability: Architectural precast concrete units that do not comply with acceptability requirements in PCI MNL-117, PCI MNL-135, and PCI Certification Category AC, including concrete strength, manufacturing tolerances, and color and texture range, are unacceptable and shall be removed. Chipped, spalled, or cracked units may be repaired, subject to repaired units matching the adjacent panel finish the visual mockup. Architect reserves the right to reject any unit if it does not match the

adjacent panel or visual mockup. Replace unacceptable units with precast concrete units that comply with requirements, at no additional cost to Owner.

PART 3 – FIELD EXECUTION

3.1 PREPARATION

A. Furnish anchorage devices for precast concrete units to be embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, templates, and instructions for the proper installation and location of each anchorage device.

3.2 EXAMINATION

A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting precast concrete performance.
B. Proceed with precast concrete installation only after unsatisfactory conditions have been corrected.
C. Prior to proceeding with installation, notify precast concrete erector in writing that supporting cast-in-place concrete foundation and building structural framing have attained minimum allowable design compressive strength, or supporting steel or other structure is structurally ready to receive loads from precast concrete units.

3.3 ERECTION

A. Install loose clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
B. Precast concrete supplier shall supply engineered pre-welded connection plates and hardware to Contractor, for installation in the field.
C. Erect architectural precast concrete wall panels level, plumb, and square within the specified allowable erection tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.

1. Install temporary steel or plastic spacing shims as precast concrete units are being erected. Surface-weld steel shims to each other to prevent shims from separating.
2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
3. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
2. Unless otherwise indicated, provide for uniform joint widths of ¾ in. (19 mm).

D. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on engineered shop /erection drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting operations are completed.

1. Do not allow connections to disrupt roof flashing continuity; however, concealment within roof insulation is acceptable.

F. Welding: Comply with applicable AWS D1.1/D1.1M, AWS D1.4/D1.4M, and AWS D1.6/D1.6M requirements for welding, welding electrodes, appearance of welds, quality of welds, and methods used in correcting welding work.

1. Protect architectural precast concrete units and bearing pads from damage during field welding or cutting operations, and provide noncombustible shields as required.
2. Welded connections shall be clearly detailed to show the type, size, length, and location of all welds. If this information is not presented, the erector shall obtain necessary information from the specialty engineer.
2. For galvanized metal, clean weld-affected metal surfaces with chipping hammer followed by brushing or power-tool cleaning, and then apply a minimum 0.004-in.-thick (0.10-mm-thick) coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A780/A780M.
3. Visually inspect all welds critical to precast concrete connections. Visually check all welds for completion and remove, reweld, or repair all defective welds, if services of AWS-certified welding inspector are not furnished by Owner.

G. At bolted connections, use upset threads, thread-locking compound, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness at installation. For sliding connections, properly secure bolt but allow bolt to move within connection slot.

2. For slip critical connections, one of the following methods shall be used to ensure proper bolt pretension:
   a. Turn-of-nut method, in accordance with American Institute of Steel Construction (AISC).
   b. Calibrated wrench method, in accordance with AISC.
   c. Twist-off tension control bolt method meeting ASTM F1852.
   d. Direct-tension control bolt method meeting ASTM F1852.

3. For slip-critical connections, the method to be used and the inspection procedure to be used shall be approved by Architect and coordinated with the inspection agency.

H. Grouting or Dry-Packing Connections and Joints: Indicate joints to be grouted and any critical grouting sequences on shop (erection) drawings. Grout connections where required or indicated on shop (erection) drawings. Retain flowable grout in place until it gains sufficient strength to support itself, or, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for at least 24 hours after initial set.

3.4 ERECTION TOLERANCES

A. Erect architectural precast concrete components level, plumb, square, and in alignment, without exceeding the noncumulative erection tolerances listed in PCI MNL-135 or the tolerances listed in the most recently published *PCI Architectural Certification Program Supplemental Guide for Certification Category AC*.

B. Erect architectural precast concrete components level, plumb, square, and in alignment, without exceeding the following noncumulative erection tolerances:

1. Plan location from building grid datum*: ±½ in. (±13 mm).
2. Plan location from centerline of steel support†: ±½ in. (±13 mm).
3. Top elevation from nominal top elevation:
   a. Exposed individual panel: ±¼ in. (±6 mm).
   e. Nonexposed individual panel: ±½ in. (±13 mm).
4. Support elevation from nominal support elevation:
   a. Maximum low: ½ in. (13 mm).
   b. Maximum high: ¼ in. (6 mm).

5. Maximum plumb variation over the least of height of structure or 100 ft (30 m)*: 1 in. (25 mm).
6. Plumb in any 10 ft (3 m) of element height: ¼ in. (6 mm).
7. Maximum jog in alignment of matching edges:
   a. Exposed panel relative to adjacent panel: ¼ in. (6 mm).
   b. Nonexposed panel relative to adjacent panel: ½ in. (13 mm).
8. Joint width (governs over joint taper) ±¼ in. (±6 mm)
9. Joint taper exposed to view maximum ±3/8 in. (±10 mm) but not more than ¼ in. (6 mm) in 10 ft length (12 m).
10. Maximum jog in alignment of matching faces: ¼ in. (6 mm).
11. Differential bowing or camber, as erected, between adjacent members of same design: ¼ in. (6 mm).
12. Opening height between spandrels: ±¼ in. (± 6 mm).

*For precast concrete buildings > 100 ft (30 m) tall, tolerances for items "1" and "5" above can increase at the rate of ⅛ in. (3 mm) per story to a maximum of 2 in. (50 mm).

†For precast concrete elements erected on a steel frame, the tolerance in item "2" takes precedence over tolerance dimension listed in item "1."

3.5 FIELD QUALITY CONTROL

A. Testing: Owner shall engage accredited independent testing and inspecting agency to perform field tests and inspections and prepare reports.

   1. Field welds shall be subject to visual inspections and dye penetrant or magnetic particle testing in accordance with ASTM E165 or ASTM E1444 and ASTM E709. Testing agency shall be qualified in accordance with ASTM E543.
   2. Testing agency shall report test results promptly and in writing to Contractor and Architect.

B. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
C. Additional testing and inspecting, at erector's expense, shall be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS

A. Repairs will be permitted provided structural adequacy of units and appearance are not impaired.
B. Repair damaged units to meet acceptability requirements of PCI MNL-117.

C. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 ft (6 m).
D. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780/A780M.
E. Wire-brush, clean, and paint damaged prime-painted components with same type of primer used in shop.
F. Remove and replace damaged architectural precast concrete units when repairs do not comply with specified requirements.

3.7 CLEANING

A. Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to shipping.
B. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, dirt, stains, and other markings.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect adjacent work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Sections:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
3. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
4. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
5. Division 05 Section "Metal Stairs."
6. Division 09 painting Sections for surface-preparation and priming requirements.
7. Division 13 Section "Metal Building Systems" for structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
2. Welded built-up members with plates thicker than 2 inches (50 mm).
3. Column base plates thicker than 2 inches (50 mm).

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use ASD; data are given at service-load level.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of moment frame, braced frame, and shear walls.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

F. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

G. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

1. Weight Class: Standard.
2. Finish: Black except where indicated to be galvanized.

H. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

I. Steel Forgings: ASTM A 668/A 668M.

J. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened or ASTM A 36/A 36M carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Primer: Comply with Division 09 painting Sections.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 complying with ASTM A 780.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning".

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.

H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. 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.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.

3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, 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. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SCOPE

A. Fabricated steel and aluminum items, as indicated in the drawings.

1.3 SUMMARY

A. Section Includes the following items, as may be applicable to the project:

1. Shelf Angles.
2. Loose Masonry Lintels
3. Loose Bearing Plates
4. Masonry Embed Bearing Plates
5. Masonry Support Beams
6. Elevator Hoist Beams
7. Handrails and Guardrails
8. Ladders
9. Vanity Support Frames
10. Trench Drains, Grates, and Frames
11. Miscellaneous Steel Items

B. Related Requirements:

1. Section 042000 "Unit Masonry" for installing bearing plates and elevator hoist beam built into unit masonry.
2. Section 054400 “Cold-Formed Metal Trusses” for installing shelf angles supporting trusses at elevator shaft

1.4 COORDINATION

A. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following, as is applicable:

1. Shelf Angles.
2. Loose Masonry Lintels
3. Loose Bearing Plates
4. Masonry Embed Bearing Plates
5. Masonry Support Beams
6. Elevator Hoist Beams
7. Handrails and Guardrails
8. Ladders
9. Vanity Support Frames
10. Trench Drains, Grates, and Frames
11. Miscellaneous Steel Items

1.2 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.3 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Steel Tubing: ASTM A 500 (Grade B).

2.2 FASTENERS

A. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. 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.

C. Weld corners and seams continuously to comply with the following:

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 welding flux immediately.

D. Provide for anchorage of type indicated; coordinate with supporting structure.

2.4 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Galvanize miscellaneous framing and supports where indicated.

2.5 FABRICATED METAL ITEMS

A. Provide fabricated metal items, miscellaneous steel, and other items, as indicated on the Drawings.

B. Galvanize items where indicated, or otherwise scheduled.

2.6 FINISHES, GENERAL

A. Prepare fabricated metal items, miscellaneous steel, and other items, as required to receive final finish(es) as indicated, or otherwise scheduled.

B. Coordinate with other trades as required.

2.7 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize all items to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

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 welding flux immediately.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built masonry.

3.2 INSTALLING MASONRY BEARING PLATES, SUPPORTS, AND EMBEDDED ITEMS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 78.

B. Galvanized surfaces, where damaged, welded, and/or ground smooth shall be repaired using ZRC Zinc Repair Compound, high-zinc liquid galvanizing repair compound. Spray galvanizing products shall not be accepted.

END OF SECTION 055000

SECTION 055110 – STEEL AND ALUMINUM STAIRS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Architectural-type steel stairs, with concrete filled treads.
2. Architectural-type steel stairs, with decorative treads
3. Industrial-type galvanized steel stairs with galvanized steel grating treads or bent checker-plate treads.
4. Industrial-type aluminum stairs, walk-over bridge, or ships ladder with aluminum grating treads or bent checker-plate treads.
5. Steel Tube, Steel Channel, Steel Angles, or Flat Bar Stock, with welded stud or rebar anchors, for embedding into cast-in-place concrete for the attachment and support of other items indicated here, or provided elsewhere.
6. Pipe railings attached or welded to metal or aluminum stairs.
7. Pipe railings set into concrete stairs, ramps, edges, or retaining walls.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: 100 lbf/sq. ft. .
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less.

B. Structural Performance of Railings: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails:

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. 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.

3. Infill of Guards:

   a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.

   b. Uniform load of 25 lbf/sq. ft. applied horizontally.
   c. Infill load and other loads need not be assumed to act concurrently.

1.3 SUBMITTALS

A. Product Data: For metal stairs, as is applicable.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

PART 2 - PRODUCTS

2.1 METALS

A. General: All stair and rail and grating components shall be galvanized. Provide materials with smooth, flat surfaces without blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated. Galvanized.

C. Tubing: ASTM A 500 (cold formed).

D. 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.

E. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.2 MISCELLANEOUS MATERIALS

A. Extruded Abrasive Nosings: Extruded-aluminum units with abrasive filler.

1. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.

B. Fasteners: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior stairs.

C. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3,000 psi, unless otherwise indicated.

2.3 FABRICATION

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding, unless otherwise indicated. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed connections, finish exposed welds smooth and blended.
2. Use connections that maintain structural value of joined pieces.
3. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
4. Form bent-metal corners to smallest radius possible without impairing work.
5. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

B. Stair Framing: Fabricate stringers of steel channels. Construct platforms of steel channel headers and miscellaneous framing members.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0677 inch.

D. Metal Bar-Grating Stairs: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. Fabricate treads and platforms from steel grating with 1-by-3/16-inch bearing bars at 11/16 inch o.c. and crossbars at 4 inches o.c.
2. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.

E. Steel Tube / Pipe Railings: Fabricate guard railings and hand railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose.
2. Form changes in direction of railings by bending or by inserting prefabricated fittings.
3. Form curves by bending members in jigs to produce uniform curvature without buckling.
4. Close exposed ends of railing members with prefabricated end fittings.
5. Provide wall returns at ends of wall-mounted handrails.
6. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
7. Connect posts to stair framing by direct welding.

2.4 FINISHES

A. All stair and rail components to be hot-dip galvanized. Comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

D. Place and finish concrete fill for treads and platforms to comply with Division 3 Section "Cast-in-Place Concrete."

1. Install abrasive nosings with anchors fully embedded in concrete.

E. Attach handrails to wall with wall brackets.

F. Adjusting and Cleaning:

1. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

2. Sand and/or grind galvanized handrails so as to result in a smooth, burr-free, finish.

3. Prepare as required for painting, if so scheduled.

END OF SECTION 055110

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Wood framing.
2. Wood supports.
3. Wood blocking.
4. Wood nailers.
5. Wood sheathing.

B. Refer to separate Specification Sections for items not covered by this specification:

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece
3. Provide dressed lumber, S4S, unless otherwise indicated.

4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2” thickness or less, unless otherwise indicated.

B. 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: Meet or exceed those indicated per manufacturer's published values 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 MATERIALS

A. Preservative Treatment by Pressure Process: **AWPA C2 (lumber) and AWPA C9 (plywood,)** except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

B. Kiln-dry material after treatment to a maximum moisture content of **19 percent for lumber and 15 percent for plywood**.

C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. **Install 30# asphalt-impregnated felt separator sheet or self-adhering membrane flashing between wood blocking with copper-based preservatives and any framing which has a zinc, mill-finished galvanized, or hot-dipped galvanized finish.**

E. **Install only stainless steel fasteners at wood blocking with copper-based preservatives. Galvanized or coated fasteners shall not be utilized.**

2.3 DIMENSIONAL LUMBER

A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. **Load-Bearing Interior Partitions: No. 2 grade of the following species:**

1. **Mixed southern pine; SPIB.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

C. **Non-Load-Bearing Interior Partitions: No. 2 grade of the following species:**

1. **Mixed southern pine; SPIB.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

D. Exposed Framing: Hand select material for uniformity of appearance and freedom from characteristics that would impair finish appearance.

1. Species and Grade: As indicated above for load-bearing construction of same type.

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

E. **Wall Blocking: No. 2 grade of the following species:**

1. **Mixed southern pine; SPIB.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

F. **Roof Blocking: No. 2 grade of the following species:**

1. **Mixed southern pine; SPIB.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

2.4 SHEATHING

A. **Where plywood wall sheathing is indicated, utilize 1/2" CDX plywood sheathing on walls, unless otherwise noted, where stud framing is 1'-4" o.c., maximum.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

B. **Where plywood roof sheathing is indicated, utilize 5/8" CDX plywood sheathing on roof, where framing members are at 1'-4" o.c., maximum.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

C. **Where plywood roof sheathing is indicated, utilize 3/4" CDX plywood sheathing on roof, where framing members are at 2'-0" o.c., maximum.**

Utilize approved Fire Retardant Treated Plywood (FRTW), where indicated and/or required to comply with requirements for non-combustible construction type(s).

D. **Layout framing as required to ensure uniformity of spacing. Where odd spaces occur, add framing member(s) to ensure spacing does not exceed the specified maximum distance. In no case shall wall sheathing spans exceed 1'-4" o.c., or shall roof sheathing spans exceed 1'-4" (5/8" plywood) or 2'-0" o.c. (3/4" plywood).**

E. Install metal plywood sheathing clips at all unsupported edges of decking, between rafters.

2.5 MISCELLANEOUS MATERIALS

A. Fasteners:

1. Follow instructions on structural plans for fasteners, anchors, etc.

B. Building Wrap:

1. **Refer to Specification Section 072110 "Building Insulation, Weatherization, and Building Wrap System" for specific requirements for Building Wrap products, installation, inspections, and warranties required.**

PART 3 - EXECUTION

3.1 INSTALLATION

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, and similar supports to comply with requirements for attaching other construction.

B. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.

3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in the Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in the Standard Building Code.
6. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in the International One- and Two-Family Dwelling Code.

D. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

E. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

F. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

G. Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

1. Comply with "Code Plus" provisions in above-referenced guide.

H. Building Wrap Application: Cover wall sheathing with building wrap as indicated. Cover upstanding flashing with 4-inch (102-mm) overlap. Seal seams, edges, and penetrations with tape.

I. Apply sheathing tape to joints between sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

END OF SECTION 061000

SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Standing and running trim.

a. Wood Base
b. Wood Base Shoe
c. Wood Trim at Walls
d. Wood Trim at Millwork and/or Casework
e. Miscellaneous Wood Trims

B. See Division 6 Section "Interior Architectural Woodwork" for interior woodwork not specified in this Section.

1.2 SUBMITTALS

A. Product Data: Provide profiles for each profile and each type of product and process indicated.

B. Samples: For the following:

1. Each profile and species required, indicating the maximum variation in grain and color.

2. Each type of finish required, applied to each profile and species being utilized.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee Board of Review.

B. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."

C. Fire-Retardant Treatment: Where indicated, use materials impregnated with fire-retardant chemicals per AWPA C20; exterior type or interior Type A as required.

2.2 STANDING AND RUNNING TRIM

A. Interior Standing and Running Trim: Finished lumber and moldings.

1. **Species and Grade and/or Cut: Poplar, Paint Grade**

2. **Finish: S2S or S4S material, as required by the application.**

3. **Paint/Stain color: To be selected.**

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours.

3.2 INSTALLATION

A. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where required for alignment. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts.

B. Standing and Running Trim: Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Utilize mitered laps. Stagger joints in adjacent and related trim. Cope at returns and miter at corners. Glue and nail all joints, returns, and miters.

C. Fill all fastener holes with color-matched wood putty, in multiple applications, if required. Sand smooth, flush with adjacent surfaces. Repeat if necessary, due to shrinking of filler material.

D. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

END OF SECTION 062000

SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK, CASEWORK, & COUNTER TOPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes interior woodwork including for the following applications:

1. Solid Wood Cabinets and Millwork items.
2. Plastic Laminate Clad Casework.
3. Plastic Laminate Clad Countertops.
4. Quartz Countertops
5. Solid Polymer Window Sills

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips, unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Samples: Provide actual samples indicating the manufacturer's full range of product and/or color selections for the following:

1. Trim profiles for selection.
2. Cabinet hardware and accessories.
3. Laminate color samples for selection.
4. Quartz Countertop samples for selection.
5. Solid Polymer Countertop samples for selection.

B. Shop Drawings: Include location of each item, plans and elevations, large-scale details, attachment devices, and other components.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

B. Granite: MIA's "Dimension Stone Design Manual" Chapters 13 & 17 & NBGQA's "Standard Specifications for Architectural Granite"

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood for Opaque Finish:

1. Species: **Poplar, Birch, or other closed-grain hardwood.**
Note: Pine, Spruce, or Fir materials shall NOT be acceptable for interior wood trim or cabinet facings.

B. Wood for Transparent Finish:

1. Species and Cut: **Not Applicable**
2. Finish: **S4S.**
3. Paint/Stain color: **To be selected.**

C. Wood Products:

1. Hardwood Plywood and Face Veneers: HPVA HP-1.
    a. Cabinets with opaque finish: **Poplar or other closed-grain hardwood**
    b. Cabinets with transparent finish: **Not Applicable**

D. Wood Trim:

1. Casings: Stain Grade: **Not Applicable**
2. Paint Grade: **Poplar or other closed-grain hardwood.**
3. Profile: **Size and profile as indicated on drawings.**
    a. Locate casings at interior side of exterior door and window frames.
    b. Locate casings at both sides of interior door frames and cased openings.
    c. Miter all corner joints.

4. Cased openings, door jambs and window returns:
   Stain Grade: **Not Applicable**
   Paint Grade: **Poplar or other closed-grain hardwood.**
   Profile: **Size and profile as indicated on drawings.**

   a. Field cut to fit required dimensions. Plane and sand exposed cut edges to match factory surfaced edges.

5. Base: Stain Grade: **Not Applicable**
   Paint Grade: **Not Applicable**
   Profile: **Size and profile as indicated on drawings.**

   a. Locate base at the perimeter of all rooms, unless specifically noted otherwise.
   b. Miter or cope all corner joints for a tight fit.

6. Base Cap: Stain Grade: **Not Applicable**
   Paint Grade: **Not Applicable**
   Profile: **Size and profile as indicated on drawings.**

   a. Locate base at the perimeter of all rooms, unless specifically noted otherwise.
   b. Miter or cope all corner joints for a tight fit.

7. Base Shoe: Stain Grade: **Not Applicable**
   Paint Grade: **Not Applicable**
   Profile: **Size(s) and profile(s) as indicated on drawings.**

   a. Locate Base Shoe at the perimeter of all rooms with hard floors, unless specifically noted otherwise.
   b. Miter all corner joints for a tight fit.

8. Crown Moulding: Stain Grade: **Not Applicable**
   Paint Grade: **Not Applicable**
   Profile: **Size(s) and profile(s) as indicated on drawings.**

   a. Locate Crown Moulding at the perimeter of all rooms, unless specifically noted otherwise.
   b. Miter or cope all corner joints for a tight fit.

E. Plastic Laminate Clad Casework - Unless noted otherwise, **provide cabinet cases with flush overlay doors constructed of one layer of 3/4" plywood or MDF, with plastic laminate cladding at the exterior face(s), and any exposed interior (open) surfaces. Concealed interior faces of cabinets with doors and drawers shall have high pressure melamine interiors (selection to be made from White, Almond, Gray, or Black). Shelves shall be minimum 1" thick material, with 3mm edge banding. Cabinet front edges covered by doors or drawers shall have 1mm edge banding. All other cabinet case edges, door edges, and drawer edges, and shelf edges shall have 3mm PVC edge banding. 3mm edge banding shall match the laminated color selected. Laminate color selection shall be from the manufacturer's standard color offerings.**

F. Plastic Laminate Clad Plywood Tops - Unless noted otherwise, **provide counter tops 1-1/2" thick constructed of two layers of 3/4" plywood, particle board, or MDF, with plastic laminate cladding and 3mm PVC edge banding or 3mm edge banding shall match the laminate color selected. Laminate selection shall be from the manufacturer's standard color offerings.**

Where required for clearance of items below countertops, such as undercounter refrigerators or ice machines, provide 1" thick counter tops of plywood, particleboard, or MDF, with plastic laminate cladding and 3mm PVC edge banding or 3mm edge banding shall match the laminate color selected. Laminate selection shall be from the manufacturer's standard color offerings.

G. Plastic Laminate Clad Plywood Backsplash and Endsplash - Unless noted otherwise, **provide backsplash and endsplash constructed of one layer of 3/4" plywood, with plastic laminate cladding and 3mm PVC edge banding. 3mm edge banding shall match the laminated color selected. Laminate selection shall be from the manufacturer's standard color offerings.**

H. High-Pressure Decorative Laminate Facing

1. **WILSONART High Pressure Decorative Laminate, Standard Line (not including Premium Colors or Finishes), color selection shall be made from the manufacturer's full range of available colors.**

I. Solid-Polymer Surfacing Material: Where indicated, provide Homogeneous solid sheets of polyester resin and marble dust, in 1cm, 2cm, or 3cm thickness, by one of the following manufacturers:

1. DuPont Corian
2. Wilsonart Solid Surfacing
3. Prior Approved equal

J. Quartz Counter Top Material: Where indicated, provide solid sheets of engineered quartz, in 1cm, 2cm, or 3cm thickness, by one of the following manufacturers:

1. Cambria Quartz
2. Wilsonart Quartz
3. Ceasarstone
4. DuPont Corian Quartz (previously Zodiaq)
5. Prior Approved equal

K. Quartz Wall Cladding Material: Where indicated, provide solid sheets of engineered quartz, in 1cm, 2cm, or 3cm thickness, by one of the following manufacturers:

1. Cambria Quartz
2. Wilsonart Quartz
3. Ceasarstone
4. DuPont Corian Quartz (previously Zodiaq)
5. Prior Approved equal

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials for a complete installation of architectural woodwork.

B. Frameless Concealed Hinges (European Type): 105º swing, mortised into stile and rail doors.
1. Overlay dimension as required for the cabinet location and layout.

C. Pulls: Provide **4" x 1/4" diameter wire pulls** at all cabinet doors and drawers. Color to be selected by Architect, based on cabinet color.

D. **Locks: Heavy-Duty / Institutional Grade Keyed Deadbolt Cylindrical Cabinet Locks.**
1. **Locks shall Keyed alike by room or workstation, as required by Owner.**
2. **Locks shall be secured to the door or drawer by (4) #10 coarse thread screws.**
3. **Equal to Olympus Lock, Series 100/200.**

E. Adjustable Shelf Standards and Supports:
1. Unless specifically noted otherwise, all shelves will be adjustable.
2. Drill holes uniformly spaced at 1” at cabinet body sides to accommodate
3. Provide **steel offset shelf pins with ¼" shank**. Color to be selected by Architect to match cabinet color.

F. Drawer Slides: Side-mounted, full extension, self-closing, zinc-plated steel drawer slides with steel ball bearings.

1. Box Drawer Slides: 100 lbf.
2. File Drawer Slides: 200 lbf.
3. Pencil Drawer Slides: 45 lbf.

G. Catches: Magnetic.

H. Exposed Hardware Finishes: Complying with BHMA A156.18
1. Provide finishes as specified above in Part 2.2.C.

2.3 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Premium, complying with the referenced quality standard.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs.
3. Seal edges of openings in countertops with a coat of varnish.
4. For trim items wider than available lumber, use veneered construction. Do not glue for width (except at raised door panels).
5. Back-out or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
6. Assemble casings in plant except where limitations of access to place of installation require field assembly.
7. Cabinet bases are to be built of 2x dimensional lumber (no plywood or particle board).
8. Toe-kicks are to be clad to match cabinet body and provided with matching base shoe.

B. Wood Cabinets for Transparent Finish:

1. AWI Type of Cabinet Construction: Face frame cabinets with overlay doors.

2. Reveal Dimension: 1/2 inch.

3. Grain Matching: Run and match grain horizontally for drawer fronts, and vertically for doors and fixed panels.

4. Matching of Veneer Leaves: Book match.

5. Veneer Matching within Panel Face: Center match.

6. Semi-exposed Surfaces Other Than Drawer Bodies: Match species and cut indicated for exposed surfaces.

    a. Drawer Sides and Backs: Solid-hardwood lumber or hardwood plywood, to match species indicated for exposed surfaces.
    b. Drawer Bottoms: Hardwood plywood, to match species indicated for exposed surfaces.

7. Shelves shall be minimum ¾" plywood, species to match cabinet body, with minimum ¾" x 1-1/2" solid hardwood edging.
8. Door Style: Raised panel

    a. Edge, stile and rail, and panel profiles to be selected from manufacturers full range of options.

9. Drawer fronts shall be ¾" solid hardwood, species to match cabinet body, with edge detail as selected by Architect.

C. Wood Cabinets for Opaque Finish:

1. AWI Type of Cabinet Construction: Face frame cabinets with overlay doors.

2. Reveal Dimension: 1/2 inch.
3. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.

4. Semi-exposed Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.

    a. Drawer Sides and Backs: Solid-hardwood lumber or hardwood plywood.
    b. Drawer Bottoms: Hardwood plywood.

5. Shelves shall be minimum ¾" plywood, species to match cabinet body, with minimum ¾" x 1-1/2" solid hardwood edging.
6. Door Style: Raised panel

    a. Edge, stile and rail, and panel profiles to be selected from manufacturers full range of options.

7. Drawer fronts shall be ¾" solid hardwood, species to match cabinet body, with edge detail as selected by Architect.

D. Plastic Laminate Clad Cabinets:

1. AWI Type of Cabinet Construction: Face frame cabinets with overlay doors.

2. Reveal Dimension: 1/4 inch.
3. Material for Exposed Surfaces: Plastic Laminate Cladding, shop applied to particle board core.

4. Material for semi-exposed Surfaces: Melamine cladding, factory applied to particle board core.
5. Shelves shall be 1" thick particle board with plastic laminate cladding.
6. Door Style: Flush
7. Drawer fronts are to be ¾" particle board with plastic laminate cladding, to match cabinet body.
8. Edge banding: provide 3mm edge banding at all edges of all doors and drawer fronts and bodies.

E. Plastic Laminate Clad Counter Tops:

1. Material: One (1) layers of plywood, particle board, or MDF 1" thick, with plastic laminate cladding.

2. Edge Detail: 13mm edge banding, color-matched to laminate color.

3. Backsplash/Endsplash: One (1) layer of plywood, ¾" thick x 3½" high (or as indicated on the drawings), with plastic laminate cladding, to match counter tops.

4. Sealant: Caulk all joints at counter tops and backsplash/endsplash with color-match sealants (at all top-to-wall, top-to-backsplash, and backsplash-to-wall joints).

2.4 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Quality Standard: Comply with AWI Section 300.

B. Grade: Premium.

C. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Quality Standard: Comply with AWI Section 300.

B. Grade: Premium.

C. Wood Species: Any closed-grain hardwood.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Condition woodwork for a minimum of 72 hours to average prevailing humidity conditions in installation areas and examine and complete work as required, including removal of packing and back-priming before installation.

B. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in this Section for type of woodwork involved.

C. Quality Standard: Install woodwork to comply with WIC Section 26 for the same grade specified in this Section for type of woodwork involved.

D. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.

E. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished. All end joints, splice joints, and inside/outside miter joints are to be glued and nailed.

H. 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.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. There shall be no exposed fasteners upon completion.

I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Caulk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

J. Provide and install ¾" CDX plywood deck, continuous below all stone tops and cultured marble/cultured granite tops.

K. Caulking:

1. **Caulk ALL joints at and adjacent to countertops, including: countertop-to-wall, countertop-to-adjacent cabinets, countertop-to-backsplash/endsplash, and backsplash/endsplash-to-wall with color-matched caulking, at both wet and dry countertop locations, without exception.**
2. Caulk joints at painted or laminate-clad cabinets to wall with color-matched caulking.
3. Joints at stain-grade cabinets to wall are to be scribed, sanded, and tightly fitted to match the profile of the wall. Joints larger than 1/32" will be considered unacceptable.

END OF SECTION 064020

SECTION 072111 - BUILDING INSULATION AND SEALING OF PERIMETER ENVELOPE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior wall cavity insulation.
2. Interior wall cavity insulation.
3. Ceiling cavity insulation (if applicable).
4. Platform cavity insulation (if applicable).
5. Attic insulation (if applicable).
6. Sealants and Caulking.
7. Sealing of the Building Perimeter Envelope

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

C. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards and, for preformed units, in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

B. Where insulation is exposed or open to air spaces in plenums, cavities, or similar voids, include only products that comply with building codes for fire-test-response characteristics. Surface-burning indices indicated for foam-plastic insulations are examples only and generally represent maximums allowed by model building codes for foam-plastic insulation.

C. **CONTRACTOR NOTE: ALL INTERIOR WALLS SHALL RECEIVE FIBERGLASS THERMAL or ACOUSTICAL BATT INSULATION TO MATCH THE WALL THICKNESS, FULL-HEIGHT AND FULL-WIDTH OF ALL WALLS, WHETHER OR NOT SPECIFICALLY NOTED ON DRAWINGS AND/OR DETAILS**

1. **Provide and install unfaced fiberglass thermal batt insulation - ASTM C 665, Type I, Class A, at all exterior walls, floors, and ceilings at locations and in thicknesses as indicated and/or scheduled.**

    a. 3-5/8" (R-15, minimum)
    b. 5-1/2" (R-19, minimum)
    c. 6" (R-20, minimum)
    d. 8" (R-25, minimum)
    e. 10" (R-30 minimum)
    f. 12" (R-38 minimum)

2. **Provide and install unfaced fiberglass acoustical batt insulation ASTM C 665, Type I, Class A, at all interior walls - at locations and in thicknesses as indicated and/or scheduled.**

    a. 3-5/8" (R-15, minimum)
    b. 5-1/2" (R-19, minimum)
    c. 6" (R-20, minimum)
    d. 8" (R-25, minimum)
    e. 10" (R-30 minimum)
    f. 12" (R-38 minimum)

3. Install full-thickness fiberglass batt insulation at ceiling / roof cavities to match framing/void dimensions, as required to completely fill the void. ASTM C 764, Type I, Class A.

4. Install full-thickness fiberglass batt insulation at platform / ramp and step cavities to match framing/void dimensions, as required to completely fill the void. ASTM C 764, Type I, Class A.

5. Install 12" thickness (R-38, minimum) fiberglass blowing insulation above sheetrock ceilings where indicated and/or scheduled. ASTM C 764, Type I, Class A.

D. Manufacturers: Provide insulating materials that comply with requirements and with referenced standards from one of the following manufacturers:

1. Owens Corning
2. Johns Manville
3. Knauf Insulation

2.2 SEALANTS AND CAULKING

A. **General: Provide expanding spray foam, non-expanding spray foam, and/or caulking at all voids, cracks, and joints in exterior framing and sheathing, not otherwise insulated, as required to create an airtight barrier.**

1. **Caulk the entire perimeter of all exterior top and bottom plates to adjacent construction.**

2. **Castle cut top of gypsum board at all exterior envelope walls, rated walls, and smoke partitions match the profile of the metal form deck, or roof deck, above. Fit gypsum board tight to metal deck, leaving 1/8" (minimum) to 3/8" (maximum) gap for caulking.**

3. **Scribe, transfer, and cut top of gypsum board at all structural and other members penetrating the exterior envelope walls, rated walls, and smoke partitions match the profile of the metal form deck, or roof deck, above. Fit gypsum board tight to metal deck, leaving 1/8" (minimum) to 3/8" (maximum) gap for caulking.**

4. **Caulk the entire perimeter of the top and bottom of all gypsum board walls at the exterior walls to adjacent construction continuous with an approved non-self levelling, gun grade, polyurethane sealant.**

5. **Use expanding spray foam insulation to fill voids at all corner framing, tees,**
And other framing conditions resulting in a void which cannot easily be insulated with batt insulation.

6. **Use expanding spray foam insulation to fill voids at all penetrations in top and bottom plates or decking for piping, electrical, and low-voltage wiring.**

7. **Use caulking and/or non-expanding spray foam at the perimeter of all window and door openings to prevent bowing of frames, resulting in binding which may compromise proper operation.**

8. **Fully seal all penetrations, joints, and transitions between materials at the exterior envelope of the building, as required to prevent thermal and/or moisture transfer. Utilize polyurethane or butyl rubber sealants with tensile strength and elongation as appropriate for the application.**

9. **Fully seal all penetrations, joints, and transitions between materials at interior walls indicated as Acoustical and/or Sound Partitions, as required to prevent transfer of noise. Utilize polyurethane or butyl rubber sealants specifically designated as appropriate for acoustical applications, with tensile strength and elongation as appropriate for the application.**

10. **Fully seal all penetrations, joints, and transitions between materials at interior walls indicated as Smoke Partitions, as required to prevent transfer of smoke and hot gasses. Utilize polyurethane or butyl rubber sealants with tensile strength and elongation as appropriate for the application. Refer to Specification Section 078998 "Rated Assemblies and Smoke Partitions" for specific requirements.**

11. **Fully seal all penetrations, joints, and transitions between materials at interior walls indicated as Fire Rated Partitions, as required to prevent transfer of fire, smoke, and hot gasses. Utilize UL Tested and approved intumescent and/or non-intumescent sealants as appropriate for the application. Refer to Specification Section 078998 "Rated Assemblies and Smoke Partitions" for specific requirements.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install insulation to comply with insulation manufacturer's written instructions applicable to products and application indicated. Install insulation in thickness(es) indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

1. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

END OF SECTION 072110

SECTION 072150 – POLYURETHANE SPRAYED FOAM INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. **Closed-Cell Polyurethane Sprayed-Foam Insulation with approved Intumescent Thermal and Ignition Barrier.**

   CONTRACTOR NOTE: OPEN-CELL SPRAYED-FOAM INSULATION IS NOT APPROVED OR ALLOWED FOR USE ON THIS PROJECT.

B. Refer to Division 7, Section "Building Insulation" for other types of insulation.

1.2 SCOPE OF WORK

A. Furnish all labor, materials, tools and equipment necessary for the application of closed-cell polyurethane foam insulation with thermal/ignition barrier at walls and roofs, as indicated. This includes accessory items subject to the general provisions of the contract.

B. IRC and IBC codes require that Spray Foam Insulation be separated from the interior of a building (Habitable Space) by a thermal barrier, which is applied over the SPF to slow thermal rise during a fire, and delay its involvement in a fire. A building code definition of an approved thermal barrier is one that is equal in fire resistance to 1/2 inch gypsum board. Thermal barriers limit the temperature rise of the underlying SPF to not more than 250 degrees F (121 degrees C) after 15 minutes of fire exposure in compliance with NFPA 286 or ASTM E 119 (Test Methods for Fire Tests of Building Construction Materials). Thermal barriers meeting this criterion are termed a 15 minute thermal barrier or classified as having an index of 15.

   NOTE: AT ALL LOCATIONS AND APPLICATION TYPES, THE SPRAYED POLYURETHANE FOAM SHALL BE COVERED WITH AN APPROVED INTUMESCENT THERMAL AND IGNITION BARRIER, WITHOUT EXCEPTION, REGARDLESS OF WHETHER OR NOT SPECIFICALLY NOTED OR INDICTED.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

2. ASTM D 1621- Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
3. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
4. ASTM D 1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
5. ASTM D 2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
6. ASTM D 2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
7. ASTM D 4444 - Standard Test Method for Laboratory Standardization and Calibration of Hand-Held Moisture Meters.
8. ASTM D 4449 - Standard Test Method for Visual Evaluation of Gloss Differences Between Surfaces of Similar Appearance.
9. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
11. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
12. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
13. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
14. ASTM E 330 Mod.- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
15. ASTM E 413 - Classification for Rating Sound Insulation.
16. ASTM E 970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source.
17. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
18. ASTM E 1334 - Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.

B. Federal Trade Commission (FTC): 16 CFR Part 460 - Labeling and Advertising of Home Insulation

C. International Code Council (ICC): AC377 - Acceptance Criteria for Spray- Applied Foam Plastic Insulation.

D. International Residential Code (IRC):

1. IRC Section R314.5 - Foam Plastics - Specific Requirements.
2. IRC Section R 316- Foam Plastics- Specific Requirements
3. IRC Section R318 - Moisture Vapor Retarders.
4. IRC Section R806.4 - Unvented Attic Assemblies.

E. International Building Code (IBC): Chapter 26.

F. National Fire Protection Association (NFPA):

1. NFPA 259 - Standard Test Method for Potential Heat of Building Materials.
2. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
3. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

G. Underwriters Laboratories Inc. (UL):

1. UL 723 - Test for Surface Burning Characteristics of Building Materials.

1.4 **SUBMITTALS**

A. Submit under the provisions of Section 013000.

B. Product Data: For each product indicated.

C. Product test reports.

D. Research/evaluation reports.

E. Written documentation from the manufacturer that the closed-cell sprayed-foam insulation is compatible and recommended for use in conjunction with the thermal barrier/ignition barrier proposed.

F. Shop drawings detailing construction, installation, accessories or other fabricated items, if required.

G. Manufacturer's application and installation instructions.

H. Safety and handling instructions for storage, handling and use of the materials including Material Safety Data Sheets (MSDS) on each product intended for use.

I. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper installation of the closed-cell sprayed-in-place insulation system.

J. Spray Applicator to provide Insulation Certificate and R-value Markers as required by the Federal Trade Commission 16 CFR Part 460-Labeling and Advertising of Home-Insulation: Trade Regulation Rule; Final Rule.

1.4 QUALITY ASSURANCE

A. All work is to be performed by applicators certified by the Manufacturer for the application of the specified systems.

B. Applicator Qualifications: Applicator shall have a minimum of two years experience installing similar systems, and shall provide a list of 10 projects similar in scope to the Architect or the Owner's representative, upon request.

C. Fire-Test-Response Characteristics: Provide insulation systems and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 and NFPA 286 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by the Architect.
3. Remodel mock-up area as required to produce acceptable work.

1.05 MATERIALS, DELIVERY AND STORAGE

A. Materials shall be delivered in the manufacturers original, tightly sealed containers or un-opened packages clearly labeled with the manufacturer's name, product identification, safety information, UL approvals, and batch or lot numbers where applicable.

B. Containers shall be stored out of the weather and away from direct sunlight at temperatures and humidity within the limits specified by the materials manufacturer.

C. All materials shall be stored in compliance with local fire and safety codes.

1.06 ENVIRONMENTAL 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 limits.

B. Do not apply sprayed-in-place insulation below the temperature (or within 5 degrees of the dew point) specified in the manufacturer's product data sheets.

C. Apply polyurethane foam insulation to substrates with surface temperatures within the manufacturer's suggested range.

D. Apply thermal barriers and ignition barrier in accordance with local building code requirements.

1.07 SEQUENCE OF SCHEDULING

A. Coordinate installation of sprayed-in-place insulation system to occur when the building envelope is complete and weathertight, and the required preparation of the perimeter walls and/or roof are complete, and in coordination with other building trades.

1.08 SAFETY REQUIREMENTS

A. All non-essential personnel are restricted from access to the area where the sprayed-in-place insulation is being applied.

B. Prior to installation of sprayed-in-place foam insulation systems:

1. Review MSDS and be familiar with chemicals and their hazards.
2. Post warning signs at all work area entrances to restrict entry by unauthorized personnel.
3. Eliminate any welding or open flame.
4. Ground equipment to prevent sparking.
5. Seal off work area from adjacent rooms and ventilation ducts.
6. Restrict access of non-application personnel including other trades.
7. Do not eat, drink, or smoke in work area.
8. Use engineering controls to ventilate the area if possible.
9. Wear breathing, body, glove, and eye protection during application and for the 24 hours following application for the sprayer and any necessary spectators.
10. Provide ventilation as needed. Contact the manufacturer as necessary for guidance on ventilation time and re-occupancy for the formulation you are using.

1.09 WARRANTY

A. Warranty: Provide manufacturer’s standard limited warranty.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design for Closed Cell Spray Polyurethane Foam Insulation Systems:

1. The following manufacturers and products are approved for use:

a. AirTight CC - manufactured by Lapolla Industries, Inc.
b. GacoONEPass - manufactured by Gaco Western
c. Foamsulate 220 - manufactured by Foamsulate/An Accella Brand
d. SealTite Pro Closed Cell - manufactured by Carlisle / Spray Foam Div.

B. Substitutions: **BY PRIOR APPROVAL ONLY.**

1. Requests for substitutions will be considered only if submitted in accordance with the provisions of Division 1, Section "Substitutions and Prior Approvals".

2. Requests for substitution must be submitted with supporting documentation no later than 10 days prior to Bid Date. Requests received later than 10 days prior to Bid Date, or without the necessary supporting documentation to verify the proposed product is equal or superior to that specified will not be considered.

2.02 CLOSED-CELL SPRAY FOAM FOR BUILDING ENVELOPE INSULATION

A. Basis of Design: **AirTight CC as manufactured by Lapolla Industries, Inc.**

B. Description: The sprayed-in-place foam insulation shall be a two component system made by combining an isocyanate (A) component with a polyol (B) component and shall possess the specified physical properties as substantiated by the following minimum test values:

C. Applications: Products tested and approved for installation in Type 1, 2, 3, 4, 5a and 5b IRC Residential and IBC Commercial buildings.

D. PHYSICAL PROPERTIES / MINUMUM TEST VALUES

1. Approved by a recognized National Testing Agency for use in Construction Type: **IBC Type II-B / NFPA 101 Type II(000).**
2. **Class "A" fire resistance rating.**

3. Core Density, Sprayed-in-Place (ASTM D-1622): **2.0 lbs/ft3 (minimum)**
4. Aged "R" Value (ASTM C-518): **6.5 per inch***
5. Compressive Strength, Parallel to Rise (ASTM D-1621): **25.0 psi (minimum)**

6. **Evaluated and listed by ABAA as an approved air barrier material.**
7. Air Leakage (ASTM E283-04): **<0.02L/s/M2 at 2.0 inches, Air Barrier at 1" thickness**
8. Closed Cell Content (ASTM D-2856): **>90%**
9. Tensile Strength (ASTM D 1623, 15 minimum): **40-48 psi.**
10. Water Vapor Transmission @ 74°F, perm inch (ASTM E96) 2.5 max.: **1.42 perms @ 1", 0.95 perms @ 1.5"**
11. Dimensional Stability: 28 days at 160°F (71 degrees C) @ 100% RH (ASTM D-2126) 15% max. by volume change: **4%**
12. Sound Transmission:
    a. Sound Transmission Class (ASTM E 90/ASTM E 413 Sound Transmission Loss in dB): **38**.
    b. Indoor-Outdoor Transmission Class (ASTM E 1332): **28**.
    c. Noise Reduction Coefficient (ASTM C 4230): **0.10**.
13. Compliance: NFPA 285, NFPA 286, NFPA 259, ASTM E 970.
    a. Flame Spread (ASTM E 84/UL 723): **Class 1, 25 or less.**
    b. Smoke Development (ASTM E 84/Also known as ANSI 2.5, NFPA 255, UBC 8-1 (42-1) and UL 723): **Class 1, 450 or less**
    c. Fire Test (ASTM E 119): **1 hour rated.**
    d. Fire Test (ASTM E 119): **2 hour rated.**
14. Structural Strength for Wind Uplift Roof Deck (ASTM E 330 Modified).

***** NOTE: Federal Trade Commission regulations published in the Federal Register 16 CFR, Part 460 require that R-value testing of polyurethane foam insulation must be conducted on aged samples at a 75ºF mean test temperature. Failure to comply can result in substantial fines by the FTC.

2.03 IGNITION/THERMAL BARRIER

A. **NOTE: At all locations and application types, the sprayed polyurethane foam shall be covered with an approved Intumescent Thermal and Ignition Barrier, without exception.**

B. Basis of Design: Fire-Lok DC-315 as manufactured by International Fireproof Technology, Inc.

C. Description: A single component, single application, spray or roller applied protective coating, tested and approved for use as a Thermal/Ignition Barrier in accordance with the requirements of **NFPA 286**.

D. Applications: Products tested and approved for installation in Type 1, 2, 3, 4, 5a and 5b IRC Residential and IBC Commercial buildings.

E. Compatibility: Only products which are certified by the manufacturer of the sprayed polyurethane foam system for use with the specific sprayed polyurethane foam system being utilized, and which have been tested and approved in an assembly with the Sprayed Polyurethane Foam Insulation in accordance with ASTM E-84 and NFPA 286 will be approved.

F. PHYSICAL PROPERTIES / MINUMUM TEST VALUES

1. Finish: **Flat.**
2. Color: **Off-white.**
3. VOC content: **47 g/L.**
4. Solids by Volume: **65 percent.**
5. Reducing Agent: **Water.**
6. Compliance: NFPA 285, NFPA 286, NFPA 259, ASTM E 970.
    a. Flame Spread (ASTM E 84/UL 723): **Class 1, ≤0.**
    b. Smoke Development (ASTM E 84/Also known as ANSI 2.5, NFPA 255, UBC 8-1 (42-1) and UL 723): **Class 1, ≤10.**

2.04 PRIMER

A. Install compatible primer if required by the manufacturer, based on project requirements.

PART 3 - EXECUTION

3.01 APPLICATION OF PRODUCTS

A. The products intended for use in the building envelope insulation system must be applied within the manufacturer's guidelines for temperature, humidity and other atmospheric conditions. In addition, they must be sequenced so as to take into consideration substrate preparation, proper cure times and inter-pass adhesion.

3.02 SURFACE PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

B. **Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes an acceptance of substrate conditions.**

C. The substrates to which the insulation is applied shall be clean, dry, and free of frost, ice, loose debris, or contaminates that will interfere with adhesion of the spray foam insulation. The insulation shall not be applied in electrical boxes.

D. All surfaces not to receive foam shall be carefully masked to avoid overspray. This includes (but is not limited to) beams, floors, windows, doors, fireplaces, walls, light fixtures, appliances and any other surface which could be damaged by overspray.

3.03 EQUIPMENT

A. Equipment shall be capable of maintaining 1000 psi of pressure or higher and maintaining a minimum of 130 degrees. Equipment shall be capable of maintaining the manufacturer's specified ratio of A and B components on a continuous basis.

B. Equipment shall be supplied and/or approved by the manufacturer for the products being utilized.

3.04 STORAGE OF MATERIALS

A. Materials shall be maintained within the temperature range as recommended by the manufacturer. A and B chemical temperature must be within the temperature range prior to spraying.

3.05 SUBSTRATE CONSIDERATION AND PREPARATION

A. Wood

1. Plywood shall contain no more than the maximum moisture content recommended by the manufacturer.
2. Follow the manufacturer's recommendations for priming or other preparation of wood surfaces.

B. Steel

1. Primed: Metal surfaces shall be free of scale, rust or oils. Remove loose dirt or contaminants by power washing prior to application of sprayed-in-place polyurethane foam. Follow the manufacturer's recommendations for priming or other preparation of surfaces.
2. Previously painted: Metal surfaces shall be free of scale, rust or oils. Clean the painted metal surface using hand or power tools to remove loose scale and rust. Grease, oil and other surface contaminants can be cleaned using a power washer.
3. Galvanized: Primers shall be as recommended by the manufacturer.

C. Concrete and/or Masonry:

1. Concrete and/or Masonry must be cured, and loose dirt and any other contaminants, such as asphaltic materials, removed.
2. If a primer is required by the manufacturer, prime with recommended primer, at the specified rate.

D. Sheathing Board: With manufacturer's approval, sheathing boards do not need to be primed prior to the application of sprayed-in-place polyurethane foam.

3.06 PRIMER APPLICATION

A. When required by the manufacturer for the specific application, primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines to achieve the recommended thickness and coverage rate.

3.07 SPRAY APPLIED FOAM INSULATION

A. The polyurethane foam shall be processed at design temperatures and at ratio the ratio as required by the manufacturer. Refer to the manufacturer's recommendations and technical data for specific instructions.

B. Apply polyurethane foam insulation to substrates with surface temperatures within the manufacturer's suggested range.

C. Apply polyurethane foam insulation within the range of Atmospheric Conditions recommended by the manufacturer. Polyurethane foam insulation shall not be applied when the temperature is within 5 degrees F of the dew point, or as recommended by the manufacturer.

D. Apply polyurethane foam insulation in multiple passes, within the manufacturer's range of minimum and maximum thickness per application.

E. Apply the full thickness of polyurethane foam within the time frame recommended by the manufacturer.

F. Fire Safety Requirements: See API Bulletin AX-119, "MDI - Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal."

3.08 VAPOR RETARDER APPLICATION

A. When specified and/or required, a vapor barrier shall be applied to the warm side of the sprayed foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam. In low-temperature applications or in high humidity conditions, consult the manufacturer for specific instructions.

3.09 THERMAL BARRIER APPLICATION

A. Apply Thermal and Ignition Barrier to the surface spray applied foam insulation in strict accordance with the requirements of the manufacturer.

B. Apply Thermal and Ignition Barrier in sufficient thickness to achieve the required minimum 15 minute Thermal Barrier as required for compliance with NFPA 286 or ASTM E 119 (Test Methods for Fire Tests of Building Construction Materials), as documented by the manufacturer's published product data and test reports.

3.10 CLEAN UP

A. After the installation of the sprayed foam insulation is complete, the installer shall remove all masking from protected surfaces. In stud wall applications, all studs are to be scraped to allow for the application of gypsum board.

B. At the end of each work day, remove rubbish, empty containers, rags, and other discarded items from the site.

C. After completing work, clean glass and spattered surfaces from overspray, if any. Collect all trash and debris and remove from the site, leaving the site in a clean and orderly condition.

3.11 PROTECTION OF WORK

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

PART 4 – HEALTH AND SAFETY CONSIDERATIONS

4.01 HEALTH AND SAFETY INFORMATION

A. Because health and safety considerations cannot be overemphasized when using polyurethanes, consult the manufacturer's product data, MSDS Sheets, and other literature to obtain the necessary information concerning the health and safety precautions to be observed before working or handling sprayed-foam polyurethane insulation systems.

END OF SECTION 072150

SECTION 072600 – UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related Requirements:

1. Section 033000 Cast-in-Place Concrete

1.2 REFERENCES

A. ASTM International:

1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality Control/Assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer’s samples and literature.
3. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
    a. Annotate submittal indicting specific details to be used.
    b. Submittal to consider all conditions (typical and unique) on the project.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

B. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor barrier shall have all of the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum
   c. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

B. Vapor barrier products:

1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
2. Perminator 15 Mil Underslab Vapor Barrier by WR Meadows
3. No substitutions.

2.2 ACCESSORIES

A. Seams:

1. Stego Tape by Stego Industries, LLC

B. Sealing Penetrations of Vapor Barrier:

1. Stego Mastic by Stego Industries, LLC
2. Stego Tape by Stego Industries, LLC

C. Perimeter / Edge Seal:

1. Stego Crete Claw by Stego Industries, LLC
2. Stego Term Bar by Stego Industries, LLC
3. StegoTack Tape (double-sided sealant tape) by Stego Industries, LLC

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that the subsoil is approved by Engineer.

1. Level and compact base material.

3.2 INSTALLATION

A. Install vapor barrier in accordance with ASTM E1643.

1. Install vapor barrier in accordance with manufacturer's instructions using typical details. Consult with manufacturer for any unique conditions not addressed with manufacturer's standard details and directions.
2. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
3. Extend vapor barrier to the perimeter of the slab.

    a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
4. Overlap joints 6 inches and seal with manufacturer's seam tape.
5. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer's instructions.
7. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
8. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
9. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
11. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

END OF SECTION 072600

SECTION 074113 – PRE-FINISHED, PRE-FORMED METAL ROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, tools, equipment, and services for installation of the Pre-Finished, Pre-Formed Metal Roofing.

B. Coordinate with the work of other trades.

C. It is the intent of this Section that the Work shall:

1. Conform to all applicable building code requirements and of authorities having jurisdiction;

2. Be performed by a single source contractor.

3. Include, but not be limited to:

a. Preformed, Prefinished Metal Roof Panels
b. Prefinished Metal Flashings & Counter Flashings
c. Prefinished Metal Gutters and Downspouts
d. Prefinished Metal Soffit and Wall Panels
e. Roof jacks
f. Roof curbs
b. Self-Adhering Roof Underlayment (if applicable)
c. Substrate board (if applicable)
d. Roof insulation (if applicable)
f. Metal deck (if applicable)
g. All supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, weathertight, and complete installation.
h. Splash Blocks

1.2 RELATED WORK

A. Division 5 Sections as required; generally: structural steel, steel joists, and steel deck.

B. Section 061000 “Rough Carpentry”

C. Section 075001 “Preparation for Re-Roofing” (if applicable)

D. Section 075201 “Roof Insulation and Deck Board”

E. Section 076200 “Sheet Metal Flashing, Gutters, Downspouts and Trim” (Roof-Related Sheet Metal)

F. Division 22, 23 and 26: All Sections of Work relating to or affecting the roofing system, including mechanical, plumbing and electrical items penetrating roofing system.

1.3 REFERENCES

A. ASTM International (ASTM)

1. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
2. A792, Specifications for Steel Sheet, Aluminum-Zinc Alloy-Coated (Galvanized) by the Hot-Dip Process, General Requirements (“Galvalume”)
3. C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

B. Underwriters’ Laboratories (UL)

1. Tests for Uplift Resistance of Roof Assemblies
2. Tests for Impact Resistance of Roofing Materials

C. International Building Code, 2021 Edition

D. ASCE 7-16, Design Requirements for Components & Cladding, and Wind Uplift Requirements for the geographical location and topographical characteristics.

1.4 DELEGATED DESIGN SUBMITTAL

A. **Roof system design and calculations shall be performed and prepared by the Roofing Manufacturer, based on empirical test data, applicable codes and standards, and project specific requirements.**

B. **Design and Structural analysis data and calculations shall be prepared,**

signed, and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific requirements, design loads, and governing code requirements as described herein and as indicated on the drawings.

C. **Approval Drawings and "For Construction" Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

D. **Drawings and calculations shall be prepared and stamped by one Professional Engineer, duly licensed in the State of Louisiana, who is responsible for the design.**

E. **Design/Code Requirements: Roofing system shall be designed in accordance with the requirements of the following Codes, Standards, and other criteria:**

1. **IBC-2021**
2. **ASCE-7-16 – Design Requirements for Components & Cladding, and wind uplift requirements for based on the project's specific geographical location and topographical characteristics.**
3. **Risk Category: "III"**
4. **Exposure Category: "C"**
5. **Design Wind Speed: 145 MPH, 3-second gust wind speed**

1.5 SUBMITTALS

A. **The following items shall be submitted in a letter issued by the Roof Manufacturer, along with the roofing submittals, as part of the Required 10-Day Documents:**

1. **Certification by the Roofing Manufacturer that the installer is an "Approved Applicator", in current good standing, and specifically stating that the installer is both acceptable and authorized to install the proposed roofing system(s), including all required warranties.**
2. **Certification by the Roofing Manufacturer that the proposed system will comply with the manufacturer's requirements, in order to qualify the project for all specified warranties and guarantee(s).**
3. **Certification by the Roofing Manufacturer that the required**

warranties will be issued, utilizing the State of Louisiana, Department of Facility Planning & Control (FP&C) standard warranty forms, without exclusion or exception.

4. **Certification that the Roofing Manufacturer will provide the required 30-year, Non-Pro-Rated, No-Dollar-Limit Weathertightness Warranty.**
5. **Manufacturer agrees that the Louisiana 19th Judicial Court, in and of East Baton Rouge Parish, LA will be the location for conducting any and all legal proceedings.**

B. **Certifications:**

1. **Engineering Certification Letter, with Seal and Signature of the Louisiana licensed Professional Engineer responsible for the design, listing all applicable codes and design requirements, and certifying that the metal roofing system has been designed in accordance with, and meets those requirements.**
2. **Certified test results by a recognized testing laboratory or manufacturer's laboratory (witnessed and stamped by a licensed Professional Engineer) in accordance with specified performance test methods for each panel system provided.**
3. **Performance test methods for each panel system.**
4. **Testing Reports: Showing metal panels have been tested in accordance with specified the performance testing requirements.**
5. **Manufacturer's certification that materials are in compliance with the specifications, including but not limited to finish and panel material.**
6. **Letter of certification from manufacturer that panels have been produced in accordance with strictest applicable standards to ensure quality.**
7. **Letter of certification from manufacturer that the proposed installer is an Approved Installer, in good current standing with the roofing company, and meets the roofing manufacturer's requirements for issuance of the specified warranties.**
8. **Certification that the Roofing Manufacturer will, upon successful completion of the roof installation, and upon correction of any items noted as deficient on the Inspection Report(s), provide the required full 20-year, Non-Pro-rated, No-Dollar-Limit, Weathertightness Warranty.**

F. Testing Reports: Showing that the metal roofing system has been tested in

accordance with specified performance testing requirements.

G. Product Data:

1. Manufacturer's Design Standards and other data needed to prove compliance with specified requirements.
2. Manufacturer's installation instructions.

H. Samples:

1. Color charts or samples from the manufacturer's standard line of Kynar 500 or Hylar 5000 finishes for Project Manager's selection.
2. One (1) foot long sample of coated panel, including clips and fasteners.

I. Engineering Calculations: Engineering calculations defining cladding loads on all roof areas based on specified building codes, allowable clip loads, allowable fastener loads, and required number of fasteners to secure the panel clips to the designated substructure.

1. The Roofing Manufacturer and/or his Engineer shall calculate the wind uplift pressures for each zone and exposure, from the specified Design Wind Speed.

2. **Calculate wind uplift requirements for the following roof zone conditions:**
   Zone 1 - Field
   Zone 2 - Perimeter (8'-0" wide, minimum)
   Zone 3 - Corner (8'-0" wide x 8'-0" wide, minimum)
   Zone 4 - Perimeter / Overhang
   Zone 5 - Corner / Overhang

3. **Calculate uplift loads on clip fasteners with full recognition of prying forces and eccentric clip loading. Calculate the holding strength of fasteners in accordance with submitted test data provided by fastener manufacturer, and based on length of embedment and properties of materials.**

4. Engineering calculations defining cladding loads on all roof areas based on specified Building Codes, allowable clip loads, fastener loads, and required number of fasteners to secure the panel clips to the designated substructure.
5. Roofing system shall be designed in accordance with IBC-2021, and the wind uplift requirements of ASCE 7-16, for the geographic location.

6. **Design and Structural analysis data and calculations shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

7. **Drawings and calculations shall be prepared and stamped by one Professional Engineer, duly licensed in the State of Louisiana, who is responsible for the design.**

J. Shop Drawings

1. **Include all typical and non-typical roof system details, including, but not limited to: details of edge conditions, joints, corners, transitions, trim, flashing, closures, penetrations, supports, anchorages, and special details related to the project.**

2. **Include layouts of panels, details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, flashing, closures and special details. Distinguish between factory and field assembly work.**

3. **Detail and specify locations for attachments included in the Engineering Calculations.**

4. **Approval Drawings and "For Construction" Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements, as described herein and as indicated on the drawings.**

5. **Drawings and calculations shall be prepared and stamped by one Professional Engineer, duly licensed in the State of Louisiana, who is responsible for the design.**

1.7 INSPECTIONS / TESTS

A. The Owner, Architect, and Roofing Manufacturer's Representative shall at all times have access to the job site and work areas.

B. The Contractor shall will provide proper and safe facilities for such access and inspection, in accordance with applicable Federal, State, and Local laws and regulations.

C. Inspections.

1. Architect, Owner's Representative, and/or Project Manager's Inspections:

a. The Architect, Owner's Representative, and/or Project Manager will perform periodic inspections throughout the duration of the project.

b. The Architect, Owner's Representative, and/or Project Manager will inspect after the completion of each major phase of construction for approval.

2. Manufacturer Inspections:

a. An Authorized Technical Field Representative of the Roofing Material Manufacturer shall make a site visit and inspection, **no less than three (3) times during the course of the work (at each site)**, to ensure that the installation is installed in strict accordance with the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and the Roofing Manufacturer's standard details.

b. A written report of each site visit and inspection, consisting of photos and written documentation, shall be prepared by the Roofing Manufacturer's Authorized Technical Field Representative, and shall be forwarded over to the Architect, the Owner's Representative, and/or the Project Manager on each Monday following the prior week.

c. The Roofing Manufacturer's Authorized Technical Field Representative shall be responsible for:

1. Keeping the Architect, the Owner's Representative, and/or the Project Manager informed after periodic inspections as to the progress and quality of the work observed.

2. Calling to the attention of the Contractor those matters observed which are considered to be in violation of the Contract requirements.

3. Reporting to the Architect, the Owner's Representative, and/or the Project Manager, in writing, of any failure or refusal of the Contractor to correct unacceptable practices called to his attention.

4. Confirming, after completion of the work, and based on his observations and tests, that he has observed no application procedures, or other issues in conflict with the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details.

D. Any failure by the Architect, the Owner's Representative, the Project Manager, or the Roofing Manufacturer's Technical Field Representative to observe, detect, pinpoint, or object to any defect or noncompliance with the requirements of the Roofing Manufacturer's requirements, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details - of work in progress or completed work – shall not relieve the Contractor of, or reduce, or in any way limit, his responsibility of full performance of the work required of him under the requirements of the Roofing Manufacturer, the Contract Documents, the Project Specifications, the approved Shop Drawings and Engineering Data, and/or the Roofing Manufacturer's standard details.

E. The Architect, the Owner's Representative, an/or the Project Manager, on behalf of the Owner, may require tests and inspections as necessary to verify the quality of the roofing materials and/or workmanship of installation.

1. The Owner shall select the Testing Laboratory and shall pay for all costs associated with initial testing.

2. The costs for any initial tests meeting the applicable requirements shall remain the responsibility of the Owner.

3. The costs for any initial tests not meeting the applicable requirements shall become the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.

4. The costs for re-testing of any work not meeting the applicable requirements shall be the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.

5. Subsequent non-compliance with applicable requirements will result in the Owner assigning a full time, Third-Party Quality Control Representative to the project. The costs for the Third-Party Quality Control Representative shall be the responsibility of the Contractor, and shall be deducted by the Owner from the Contractor's payment for the work.

6. Laboratory tests shall be performed in accordance with the applicable ASTM standard testing procedures.

1.6 QUALITY ASSURANCE

A. Roofing Manufacturer's Qualifications:

1. The Roofing Manufacturer shall have a minimum of ten (10) years experience manufacturing roofing materials of the type specified for this Project.

B. Installer's Qualifications:

1. The Roofing Installer shall be a Roofing Manufacturer approved installer, certified and authorized by the Roofing Manufacturer as trained and qualified to install any and all of the Roofing Manufacturer's product(s) which may be applicable to the Project, and in current good standing with the Roofing Manufacturer.

2. Provide a letter of certification from the Roofing Manufacturer that the Roofing Installer has a minimum of three (3) years of successful installation experience with those product(s) to be installed on the Project, preceding the date upon which work is to commence

1.7 PRE-INSTALLATION CONFERENCE

A. The Pre-Construction Conference shall be scheduled no less than two weeks prior to commencing the Work of this section.

B. The Pre-construction conference shall be scheduled at a mutually agreeable time to ALL parties required to be in attendance.

C. The following individuals shall be in attendance at the Pre-Construction Meeting:

1. **Architect**
2. **Owner's Representative(s)**
3. **Contractor** – Owner, Project Manager, and/or Superintendent (as is applicable)
4. **Roofing Subcontractor** - Owner, Project Manager, and/or Foreman (as is applicable)
5. **Roofing Manufacturer's Technical Field Representative**
6. **Mechanical Subcontractor(s)** - Owner, Project Manager, and/or Foreman (as is applicable)
7. **Other Subcontractors performing related or abutting work** - Owner, Project Manager, and/or Foreman (as is applicable)

D. Collect and distribute contact information for all responsible parties, as well as emergency contact information.

1. Contractor shall provide 24 hour contact information for any emergencies that may arise.

a. Discuss and identify requirements for temporary barricades, in accordance with the Owner's requirements.

b. Discuss and identify storage area(s) for materials, and for location(s) of dumpsters.

c. Verify working hours, and all safety requirements of the school as it pertains to identifying employees on site; i.e. badges, uniforms or company t-shirts to be worn at all times, etc.

d. Discuss when or if progress meetings at the site with all responsible parties will be required.

e. Review installation procedures and coordination required with related Work.

f. Inspect job site conditions, and make notes and or documentation in accordance with Section 013231 "Pre-Construction Documentation" and 017839 "Project Record Documentation", prior to commencement of work.

g. Perform pull out test(s) with the specified fasteners, if not performed prior to the meeting, to verify the actual pull-out capacity of the fasteners, and adjust engineering calculations and fastener sizes/ layouts accordingly.

h. Record minutes of the conference and distribute copies to all parties present.

1. Identify outstanding issues in writing, designating the responsible party for follow-up action, and the timetable

for completion.

2. Installation of roofing system shall not begin until all outstanding issues have been resolved to the satisfaction of the Architect, Owner's Representative, and/or Project Manager.
3. Contractor shall field verify existing roof assembly and wood blocking configuration.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver metal roof system to job site properly packaged to provide protection against transportation damage.

B. Handling: Exercise extreme care in unloading, storing and erecting metal roof system to prevent bending, warping, twisting and surface damage.

C. Storage:

1. Store all materials and accessories above ground on well skidded platforms.
2. Store under waterproof covering.
3. Provide proper ventilation of metal roof system to prevent condensation build-up between each panel of trim/flashing component.

1.9 WARRANTY

A. **Roofing Manufacturer's Warranty: Roofing Manufacturer shall issue a 20-year, Non-Pro-Rated, No Dollar Limit Weathertightness Warranty, utilizing the standard State of Louisiana / LCTCS Warranty Form included in the Project Manual. Note that the included form shall be utilized without modification or exception. The warranty shall specifically include all curbs, penetrations, and roof edge terminations. Exclusion of any item, transition, or condition shall disqualify the manufacturer.**

B. **Roofing Installer's Warranty: Roofing Installer shall issue a 2-year, Materials and Labor Warranty, utilizing the standard State of Louisiana / LCTCS Warranty Form included in the Project Manual. Note that the included form shall be utilized without modification or exception.**

C. **Contractor's Roofing Warranty: The Contractor shall issue a 2-year, Labor and Material Warranty, utilizing the standard State of Louisiana / LCTCS**

Warranty Forms included in the Project Manual. Note that the included form shall be utilized without modification or exception.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. **Colors:**

Standing Seam Metal Roof Panels – To Be Selected (Kynar 500)

R-Panels @ Parapet Walls - To Be Selected (Kynar 500)

Ridge, Rake / Fascia Trim, Gutters, Downspouts, Low Eave Fascia, Rake Soffit-To- Low Eave Soffit Transition Trim - To Be Selected (Kynar 500)

B. **MANUFACTURERS AND PRODUCTS SHALL BE LIMITED TO THE FOLLOWING, SUBJECT TO THE COLOR REQUIREMENTS STATED IN SECTION 2.1.A, ABOVE:**

1. **Petersen Aluminum / PAC-Clad "T-250" Symmetrical Panel System (16" Wide)**
2. **McElroy Metal "238-T Symmetrical Panel System (16" wide)**
3. **Innovative Metals Company / IMETCO "Series 300" Symmetrical Panel System (16" wide)**

C. Materials shall be manufactured, specified, or accepted in writing by roofing manufacturer, in order to ensure full system warranty will be issued.

D. Roof panels with lap type side joints or those requiring battens or other non-integral sealing means or exposed structural fasteners will not be acceptable.

E. Roof panels shall be roll formed in the manufacturer's plant, or field-formed on a factory- certified/calibrated/approved site roll-forming equipment only by panel manufacturers approved installers.

2.2 MATERIALS

A. Metal Standing Seam Roof Panels and Trim:

1. Materials:

a. Sheet Material: Prefinished Galvalume Sheet Steel - ASTM 792-AZ-50.

b. **Panel Thickness: 22 Gauge**

c. Trim Thickness: 22 Gauge

d. Continuous Cleat Thickness: 16 Gauge (min.) Galvanized

e. Finish: Full strength Kynar 500 or Hylar 5000 Fluoropolymer coating, applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to tests for adhesion, flexibility, and longevity as specified by the Kynar 500 or Hylar 5000 finish supplier.

f. **Color: To be selected from Manufacturer's full range of standard color offerings.**

e. Touch-up Paint: Paint burns, scars, welds, and damaged and rusted surfaces with cold galvanizing paint in accordance with ASTM A780. Acceptable Products include ZRC Cold Galvanizing Compound manufactured by ZRC Chemical Products, Quincy, MA; Galvax Zinc-rich Cold Galvanizing Coating manufactured by Alvin Products, Inc., Lawrence, MA; or paint complying with military specification MILP-21035A, Type I or II.

g. Strippable Film: Applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. Remove strippable film prior to installation.

h. Accessories:

1. General: Provide all components required in accordance with the metal roof system manufacturer's approved shop drawings for a complete metal roof system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers, and other required items.

2. Fasteners: Stainless Steel with washers and manufacturer's panel clips spaced according to engineers calculations as instructed for wind uplift requirements.
3. Weatherseal: manufacturers approved weatherseal applied continuously along locking seam prior to seaming

2. **Profile/Dimensions: 16 inch wide (maximum), symmetrical or semi-symmetrical profile roof panel, with two (2) 2-3/8" or 2-1/2" high vertical legs located at each edge. Panels shall be mechanically seamed together via a separate seam cap, to form a single, structural, and weathertight joint. Seam cap, material and color shall match the adjacent roof panels. The seam or seam cap shall be machine-removable, in the event a single or group of panels within the field of the roof should ever need to be replaced.**

3. **Panels may be flat or striated full length of the panel, to minimize the effects of oil-canning, as selected by the Architect.**

4. **The panel shall have no exposed fasteners, either at the low eave, ridge, or midpoint (if fixed).**

5. **All panels shall be continuous in length from eave to ridge, with no intermediate laps.**

6. Roof assembly shall bear Underwriters Laboratories Label UL90.

B. Accessories:

1. Roof Insulation Board (if applicable): Closed cell glass reinforced poly-isocyanurate insulation board, thickness indicated on drawings, complying with ASTM C1289, Type I, Class 2 and FS HH-I-1972/1, Class 2.

2. Roof Substrate Board (if applicable): Glass-Faced Gypsum Roof Board equal to UL rated Type X "Dens Deck Prime" manufactured by Georgia-Pacific. Board size shall be 48 inches by 96 inches by 1/2 inch, unless noted otherwise. Provide primer as recommendation or required by manufacturer for Roof System.

3. Waterproofing Membrane: 60 mil thick, high temperature, SBS modified bituminous product of self- adhering type with non-stick surface conforming to "TAMKO TW-Metal and Tile Underlayment" manufactured by Tamko Roofing Products, Inc., or approved equal. Surface shall be smooth, non-granulated to prevent damage to the finish at the bottom side of the panels.

4. **Prefabricated Roof Curbs: Roof curbs, if required, shall be one-piece, all welded galvanized or aluminum, and shall be fixed to the roof structure. The roof manufacturer shall provide a "floating" flashing condition, to allow for thermal expansion of the roof system around the fixed curb. The roof curb flashing condition shall be specifically included in the 30-year, No Dollar Limit, Non-Pro-Rated Weathertightness Warranty, and shall not be excluded from the Weathertightness Warranty.**

5. **Equipment Supports, Roof Jacks, and Rooftop Walkways: Shall be product(s) of manufacturer(s) approved by the metal roof system manufacturer, so as to avoid any conflict of warranty and as specified elsewhere in the Specifications and/or Drawings.**

6. **Closures: Outside closures shall be fabricated from Galvalume sheet steel of the same gauge, finish and color as the panels. Galvanized base material is unacceptable. Outside closures consisting of a fabricated Galvalume sheet with a neoprene insert to conform and seal to the roof panel profile are acceptable.**

7. Tape Seal: Pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non- sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.

8. Joint Sealant: One-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

9. Splash Blocks: Refer to Section 076200, Sheet Metal Flashing, Gutters, Downspouts and Trim.

10. Gutter Screens: Refer to Section 076200, Sheet Metal Flashing, Gutters, Downspouts and Trim.

2.3 FABRICATION

A. Material shall be in-line tension leveled prior to roll forming panel profile.

B. Exposed adjacent flashing shall be of the same material and finish as the roof panels.

C. Hem all exposed edges of flashing on underside, 1/2 inch.

2.4 PREFABRICATED ROOF CURBS AND EQUIPMENT SUPPORTS

A. General: Comply with loading and strength requirements as indicated where units support other work. Coordinate dimensions of curbs and supports with equipment supplier/manufacturer.

B. **Prefabricated Roof Curbs: Curbs shall be one-piece, all welded galvanized or aluminum, and shall be fixed to the roof structure. The roof manufacturer shall provide a "floating" flashing condition, to allow for thermal expansion of the roof system around the fixed curb. The roof curb flashing condition shall be specifically included in the 30-year, No Dollar Limit, Non-Pro-Rated Weathertightness Warranty, and shall not be excluded from the Weathertightness Warranty.**

C. Fabricate curbs of structural quality 0.080 inch aluminum, factory baked finished after fabrication in coating compatible with and matching roof panel finish, with mitered and continuously welded corner joints. Provide integral base plates and water diverter crickets. Front base plate shall be a minimum of 18 inches from beginning of water diverter. Curbs shall be designed to install under metal roof system on the high side and over the metal roof system on the low side.

D. Curbs shall be of size and design shown on the drawings or required, with minimum height of eight (8) inches above finished metal roof system.

E. Curbs shall be constructed to match slope of roof and provide a level top surface for mounting equipment in a level horizontal position, unless shown otherwise.

F. Curb flanges shall be constructed to match configuration of roof panels.

G. Coordinate work with mechanical installer to ensure matching finish of curbs provided for roof mounted mechanical equipment.

2.5 PRE-FABRICATED ROOF JACKS

A. Pipe flashings shall be one piece EPDM (ethylene propylene diene monomer) molded rubber boot having a serviceable temperature range of minus 60 degrees F to 270 degrees F, and shall be resistant to ozone and ultraviolet rays. Units shall have an aluminum flanged base ring.

B. Provide high temperature rated rubber roof jacks at hot stacks as applicable, including but not limited to boiler flues, heater vents, steam relief, or similar conditions. Rating minimum of 400 degrees F.

C. Roof jacks shall not be excluded from the weathertightness warranty.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.

B. Verify that installation is made in accordance with approved shop drawings and manufacturer's instructions. This specifically includes verifying the secondary structural members and decking are installed to meet UL and governing building code requirements. Coordinate with metal roof system manufacturer to insure that clip spacing at eave, rake, ridge and corner areas are accommodated to meet UL90 requirements as calculated by manufacturer’s engineer.

C. Discrepancies:

1. Immediately bring discrepancies to the attention of the Architect.
2. Do not proceed with installation until discrepancies have been resolved.

3.2 INSTALLATION OF METAL ROOFING OVER METAL DECK

A. Install steel deck, to meet structural design wind uplift requirements.

B. If shown or required, install fire rated substrate board over metal deck in conformance with approved shop drawings and manufacturer's instructions.

C. If shown or required, install insulation over substrate board.

D. If shown or required, install vapor barrier over insulation in conformance with approved shop drawings and manufacturer's instructions. Lap and tape seal all joints.

E. Remove protective strippable plastic film covering from metal roof panels, trim, and related items when and in conformance manufacturer's instructions, where applicable.

F. Install metal roof system so that it is weathertight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction. Isolate dissimilar metal contact with proper taping and/or coatings.

G. Install metal roof panels, trim, and related items in accordance with approved samples with approved shop drawings and manufacturer's instructions.

H. Provide concealed anchors at all panel attachment locations.

I. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.

J. Install roof jacks in accordance with approved shop drawings and manufacturer's instructions. Install roof jacks in flat of the roof panel. Coordinate location so roof panel seams are not altered.

K. Install roof curbs in accordance with approved shop drawings and manufacturer's instructions. Anchor curbs securely in place with provisions for thermal and structural movement.

L. Install gutters and downspouts in accordance with approved samples and approved shop drawings and manufacturer's instructions.

1. Provide expansion joints on gutters spaced maximum 50 feet on center. Install snap-on cover over expansion joint.
2. Install downspouts according to Section 076200.

M. Install splash pad or block over a protection (walkway) pad for downspouts located at roof level.

N. Install gutter screens over installed gutter. Secure screen to spacer with self-tapping screw.

3.3 CLEANING AND PROTECTION

A. Remove scraps and debris from roof and work areas, and leave clean.

B. Sweep and wash roof to remove all cuttings and shavings.

C. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on prefinished metal by painting with the manufacturer's approved touch-up paint in color to match undamaged finish.

D. Clean other work damaged or soiled by Work of this Section.

E. Protect finished work from damage.

END OF SECTION 074113

SECTION 076115 – PRE-FINISHED, PRE-FORMED METAL SIDING & SOFFITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, tools, equipment, and services for installation of the Pre-Finished, Pre-Formed Metal Siding.

B. Coordinate with the work of other trades.

C. It is the intent of this Section that the Work shall:

1. Conform to all applicable building code requirements and of authorities having jurisdiction;
2. Be performed by a single source contractor.
3. Include, but not be limited to:

    a. Preformed, Prefinished Exposed Fastener Metal Wall Panels
    b. Preformed, Prefinished Concealed Fastener Metal Wall Panels
    c. Pre-formed, Pre-finished Concealed Fastener Metal Soffit Panels
    d. Pre-formed, Pre-finished Exposed Fastener Flush Metal Soffit Panels
    e. Prefinished Metal Trims, Flashings, & Counter Flashings
    f. Self-Adhering Underlayment (where scheduled, or indicated)
    g. Required Fasteners
    h. All supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, weathertight, and complete installation.

1.2 RELATED WORK

A. Division 5 Sections as required; generally: structural steel, steel joists, and steel deck.

B. Section 061000 “Rough Carpentry”

C. Section 074113 “Prefinished, Preformed Metal Roofing”

D. Section 076200 “Sheet Metal Flashing, Gutters, Downspouts and Trim” (Roof-Related Sheet Metal)

E. Section 076210 "Sheet Metal Flashing, Gutters, Downspouts and Trim for Modified Bitumen Roofing Systems"

F. Section 076220 "Sheet Metal Flashing, Gutters, Downspouts and Trim for Pre-Finished, Pre-Formed Metal Roofing Systems"

G. Division 22, 23 and 26: All Sections of Work relating to or affecting the wall system, including mechanical, plumbing and electrical items penetrating metal wall panel system.

1.3 REFERENCES

A. ASTM International (ASTM)

1. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
2. A792, Specifications for Steel Sheet, Aluminum-Zinc Alloy-Coated (Galvanized) by the Hot-Dip Process, General Requirements ("Galvalume")
3. C1289, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

B. Underwriters' Laboratories (UL)

1. Tests for Uplift Resistance of Roof Assemblies
2. Tests for Impact Resistance of Roofing Materials

C. International Building Code, 2021 Edition

D. ASCE 7-16, Design Requirements for Components & Cladding, and Wind Uplift Requirements for the geographical location and topographical characteristics.

1.4 SUBMITTALS

A. Product Data: For each type, profile, and color of metal wall panel, trim, fastener, and/or accessory indicated.

B. Shop Drawings: Show layouts of metal wall panels, including plans, elevations, sections, details, attachments to other work, and keyed references to termination points.

1. Include details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories.
2. Include details for forming, joining, and securing metal wall panels, including pattern of fasteners, locations of structural supports, termination points, expansion joints, penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.

C. Coordination Drawings: Drawn to scale and coordinating metal wall panel installation with penetrations and items indicated to be installed in, or through, walls.

D. Color Selection Chart: Provide the manufacturer's standard color selectors for panels and trims with factory applied color finish.

E. Samples for Color Verification: Provide 4"x6" actual color samples of all standard colors, as required by the Architect. Provide 4"x6" actual color samples for custom colors, if required, to match existing construction or a sample color provided by the Architect.

F. Samples for Texture Verification: Provide 4"x6" actual texture samples of all standard colors, as required by the Architect. Provide 4"x6" actual color samples for custom colors, if required, to match existing construction or a sample color provided by the Architect.

G. Material certificates.

H. Product test reports.

I. Maintenance data.

J. Warranties: Manufacturer’s Standard Warranty, Manufacturer's Standard Metal Panel and Trim Finish Warranty, and Weather tightness Warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer, if required by the manufacturer.

B. Pre-installation Conference: Conduct Pre-Installation conference at the Project site.

The Architect, Contractor, Subcontractor (if applicable), and the Owner or his designee shall be in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage. Unload, store and erect panels in a manner to prevent bending, warping, twisting and surface damage. Damaged panels shall be discarded and replaced. Protect insulation at all times. Damaged insulation shall be discarded and replaced.

1.7 WARRANTY

A. Standard Warranty on Metal 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.

B. Exposed Panel Finish Warranty shall include the following:

1. Color fading more than 15 Hunter units when tested according to ASTM D 2244.
2. Chalking in excess of a No. 2 rating when tested according to ASTM D 4214.
3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

C. Warranty period:

1. Panels & Trim: 20 years from date of substantial completion.
2. Fluoropolymer Finish Warranty Period: **20** years from date of Substantial Completion.

D. Failures include, but are not limited to, the following:

1. Structural failures, including rupturing, cracking, or puncturing.
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

PART 2 - PRODUCTS

2.1 **WALL PANEL TYPE 1 - Exposed Fastener Vertical Metal Wall Panel and Trim System**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed, or as approved by Prior Approval.

1. **Petersen Aluminum / PAC-Clad - "PBR" Purlin Bearing R-Panel**
2. **McElroy Metals - "PBR" Purlin Bearing R-Panel**
3. **MBCI – "PBR" Purlin Bearing R-Panel**
4. **Alternate products as submitted prior to bid, and approved by the Architect**

B. Panel Profile: **36" Wide Coverage Panel, with major Trapezoidal Ribs 1-1/4" or 1-1/2" high at 12" center-to-center spacing, with 2 or 3 minor stiffening ribs centered between major ribs.**

C. Surface: **Smooth, flat finish.**

D. Thickness: **22 Gauge**

E. Accessories:

1. Perimeter Trim to match conditions indicated on drawings.

F. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.

G. Exposed Finish:

1. Factory Prime Coating: White or light-colored, factory-applied, baked-on epoxy primer coat.

2. **Two-Coat Flouropolymer Coating:** Thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604 and 2605, except as modified below:

    a. Humidity Resistance: **2000** hours.
    b. Salt-Spray Resistance: **1000** hours.
    c. Color: **As selected by Architect from manufacturer's full range**.
    d. Color: **As selected by Architect from manufacturer's full range**. Concealed Finish: White or light-colored acrylic or polyester backer finish.

G. Concealed Finish: White or light-colored acrylic or polyester backer finish.

H. Fasteners: **Only 1-piece Long Life Fasteners, with integral cap and neoprene washer, as described in Part 2.4.B.1 & 2, below, shall be acceptable.**

NOTE: Under no circumstances shall exposed 2-piece fasteners or non-blind rivets be accepted for use at any exposed location or condition on this project.

2.3 SOFFIT PANEL TYPE 1 – Not applicable.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Self tapping screws, bolts, nuts, self locking rivets and bolts, end welded studs, Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of factory applied coating.

C. Fasteners for Metal Wall Panels: **One piece, self-drilling or self-tapping type "long life" screws with factory-installed EPDM washer under type 304 stainless steel heads, where exposed and/or bearing on the weather side of metal panels.**

D. Fasteners for Flashing and Trim: **High-strength aluminum or stainless-steel blind rivets and/or one piece, "long life" screws with self drilling, type 410 stainless steel or self tapping, type 304 stainless steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panel.**

E. Fastener Finishes: **All fasteners shall have Flouropolymer finish to match adjacent panel or trim finish and color, as specified and selected.**

F. Panel Sealants:

G. Sealant Tape: Pressure-sensitive, gray polyisobutylene compound sealant tape with release-paper backing; 3/4 inch or 1 inch wide and 1/8 inch (3 mm) thick.

H. Joint Sealants: ASTM C 920; as recommended in writing by metal wall panel manufacturer.

1. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
2. Elastomeric Sealant: ASTM C 920, elastomeric **non-skinning** polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
3. Butyl Sealant: ASTM C 1311, single-component, solvent-release **non-skinning** butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

2.6 ACCESSORIES

A. Flashing and Trim: Formed from metallic-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent sheet metal roofing.

B. Gutters: Formed metallic-coated steel sheet. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum **122-inch** long sections, sized according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced 36 inches (900 mm) o.c., fabricated from same metal as gutters. Provide bronze, copper, or aluminum wire ball strainers at outlets. **Finish gutters to match roof fascia and rake trim**.

C. Downspouts: Formed from metallic-coated steel sheet; in **10-foot-2-inch** long sections, complete with formed elbows and offsets. Finish downspouts to match sheet metal roofing.

D. **Factory Pre-Formed, Mitered Outside Corners, to match panel profile.**

2.7 FABRICATION

A. General: Custom fabricate metal wall panels to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, geometry, metal thickness, and other characteristics of installation indicated. Fabricate metal wall panels, trims, and accessories at the shop to greatest extent possible.

B. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.

C. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

2.8 FINISHES

A. Smooth-Finish Metal Wall Panels

1. Factory Prime Coating: White or light-colored, factory-applied, baked-on epoxy primer coat.

2. **Two-Coat Flouropolymer Coating:** Thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604 and 2605, except as modified below:

a. Humidity Resistance: **2000** hours.
b. Salt-Spray Resistance: **1000** hours.
c. Color: **As selected by Architect from manufacturer's full range**.

2.9 INSTALLATION, GENERAL

A. Lay out panels and openings before installation of metal wall panels.

B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

C. Install metal wall panels perpendicular to girts, hat channels, eave struts, and other supports provided.

D. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

E. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for a complete wall panel system and as recommended by the manufacturer.

G. Field cutting of metal wall panels by torch is not permitted.

H. Provide inside and outside foam closures with continuous tape sealants at all base-of-wall, top-of-wall, roof-to-wall, roof-height-change, and rake conditions.

I. Flash and seal sheet metal roofing with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.

J. Locate wall panel splices over, structural supports, or provide additional supports as required to fully support both sides of the splice.

K. Where possible, locate splices so as to be concealed by other items, such as downspouts.

L. Lap metal flashing under or over metal wall panels as required to allow moisture to run over and off the material.

M. Fasteners: Use fasteners of sizes that will penetrate completely through substrate, protruding a mimimum of 1".

N. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

O. 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 weathertight installation.

P. Install components required for a complete metal wall panel assembly including trim, flashings, sealants, gaskets, fillers, closure strips, and similar items.

Q. 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 will be permanently watertight and weather resistant.

2.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion where required, or recommended by the manufacturer. Coordinate installation with flashings and other components.

B. Provide elbows at base of downspout to direct water away from building.

C. Tie downspouts to underground drainage system if/where indicated.

2.11 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels and/or trim is installed.

B. On completion of metal wall panel installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing.

C. Maintain site in a clean and orderly condition during construction.

END OF SECTION 076115

SECTION 076220 - SHEET METAL FLASHING AND TRIM FOR METAL ROOFING, SIDING, AND SOFFITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Formed roof gutters and downspouts.
2. Formed low-slope roof flashing and trim.
3. Formed wall flashing and trim.
4. Formed thru-wall flashings and trim.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, and anchoring sheet metal flashing and trim.

C. Samples: For each type of sheet metal flashing and trim.

1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

B. Pre-installation Conference: Conduct a pre-installation conference at the Project site.

Refer to Section 074113 “Prefinished, Preformed Metal Roofing” for the Roofing Pre-Installation Conference.

The Architect, Contractor, Subcontractor (if applicable), and the Owner or his designee shall be in attendance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sheet metal flashing, and trims associated with the Prefinished, Preformed Metal Roofing shall be supplied by the Prefinished, Preformed Metal Roofing Manufacturer, shall be and installed by the Prefinished, Preformed Metal Roofing Manufacturer's Approved Applicator, and shall be covered under the 20-Year, No-Dollar-Limit, Non-Pro-Rated Weathertightness Warranty.

2.2 SHEET METALS

A. Stainless Steel Sheet: ASTM A 67; commercial quality, 2D annealed finish, 304 stainless steel, 22 gauge.

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality with manufacturer's standard clear acrylic coating both sides.

C. Pre-painted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.

3. Exposed Finishes: Apply the following coil coating:

a. Factory Prime Coating: Factory-applied, baked-on epoxy primer coat.

b. **Two-Coat Flouropolymer Coating (Kynar/Hylar Painted Finish) required at ALL LOCATIONS, except where specifically noted otherwise:** Thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2604, except as modified for below:

1) Humidity Resistance: **2000** hours
2) Salt Spray Resistance: **1000** hours.
3) Color: **Color(s) To Be Determined**

c. **Siliconized-Polyester Coating (at Interior Liner Panels and Trim Only)**: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

1) Color: **Not Applicable For This Project**

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Self tapping screws, bolts, nuts, self locking rivets and bolts, end welded studs, Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of factory applied coating.

1. Exposed fasteners for Metal Roof Panels: **One piece, "long life" screws with self-drilling, self-tapping, type 304 stainless steel or type 410 stainless steel, hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panel.**

2. Fasteners for Metal Wall Panels: **One piece, "long life" screws with self-drilling, self-tapping, type 304 stainless steel type or 410 stainless steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panel.**

3. Fasteners for Flashing and Trim: **High-strength aluminum or stainless-steel blind rivets and/or one piece, "long life" screws with self drilling, type 410 stainless steel or self-drilling, self-tapping, type 304 stainless steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal trim.**

4. All Fasteners: **All fasteners to have fluoropolymer or siliconized polyester finish to match adjacent panel or trim finish and color, as specified and selected.**

C. Elastomeric Sealant: ASTM C 920, **elastomeric polyurethane polymer sealant**; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

D. Butyl Sealant: ASTM C 1311, **single-component, solvent-release non-skinning butyl rubber sealant**, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled **with elastomeric** or **non-skinning butyl** sealant concealed within joints.

E. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

2.5 ROOF DRAINAGE AND SHEET METAL FABRICATIONS

A. Materials:

1. Sheet Material: Prefinished Galvalume Sheet Steel - ASTM 792-AZ-50.

2. **Thickness: 22 Gauge**

3. **Finish: Full strength Kynar 500 or Hylar 5000 Fluoropolymer coating, applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.70 to 0.90 mil over 0.25 to 0.35 mil prime coat, to provide a total dry film thickness of 0.95 to 1.25 mil. Bottom side shall be coated with primer with a dry film thickness of 0.25 mil. Finish shall conform to tests for adhesion, flexibility, and longevity as specified by the Kynar 500 or Hylar 5000 finish supplier.**

4. **Color(s): to be selected from the manufacturer's standard line of colors.**

   Standing Seam Metal Roof Panels - to be selected from the manufacturer's standard line of colors.

   Ridge, Rake Trim, Rake Fascia, Gutters, Downspouts, Low Eave Fascia, Rake Soffit-To- Low Eave Soffit Transition Trim - to be selected from the manufacturer's standard line of colors.

   Reverse-Rolled R-Panels @ Gable End Walls, Wall Panel-To-Brick Transition Trim, Rake/Gable Soffit Panels & Trim, Low Eave Soffit Panels & Trim, Soffit-To-Wall Panel Trim, Soffit-To-Brick Wall Trim, Inside Corner Trim - to be selected from the manufacturer's standard line of colors.

5. Touch-up Paint: Paint burns, scars, welds, and damaged and rusted surfaces with cold galvanizing paint in accordance with ASTM A780. Acceptable Products include ZRC Cold Galvanizing Compound manufactured by ZRC Chemical Products, Quincy, MA; Galvax Zinc-rich Cold Galvanizing Coating manufactured by Alvin Products, Inc., Lawrence, MA; or paint complying with military specification MILP-21035A, Type I or II.

6. Strippable Film: Applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. Remove strippable film prior to installation.

B. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 122-inch-long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

1. Fabricate from the following material:

   a. Pre-painted, Metallic-Coated Steel: **22 gauge.**

C. Downspouts: Fabricate **rectangular** downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Manufactured Hanger Style: Manufacturer's Standard gutter hanger.

2. Fabricate downspouts from the following material:

a. Pre-painted, Metallic-Coated Steel: **22 gauge.**

D. Base Flashing: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

E. Counterflashing and Flashing Receivers: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

F. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

G. Valley Flashing: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

H. Drip Edges: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

I. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

J. Head, Sill, Jamb, and similar flashings: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: **22 gauge.**

K. Continuous Hold-Down cleats: Fabricate from the following material:

1. Galvanized sheet metal: **16 Gauge, (minimum, or as required by the stamped engineering drawings).**

L. Drip Edge: Fabricate from the following material:

1. Pre-painted, Metallic-Coated Steel: **22 gauge.**

M. Base Flashing: Fabricate from the following material:

1. Pre-painted, Metallic-Coated Steel: **22 gauge.**

N. Thru-Wall Counterflashing and Flashing Receivers at metal walls: Fabricate from the following material:

1. Pre-painted, Metallic-Coated Steel: **22 gauge.**

O. Thru-Wall Counterflashing and Flashing Receivers at masonry walls: Fabricate from the following material:

1. **22 gauge or Stainless Steel, where indicated on the drawings.**

P. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following material:

1. Pre-painted, Metallic-Coated Steel: **22 gauge.**

Q. Head, sill, jamb, and similar flashings: Fabricate from the following material:

1. Pre-painted, Metallic-Coated Steel: **22 gauge.**

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, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and **elastomeric** or **non-skinning butyl** sealant.

E. 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.

1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at the maximum distance recommended by the manufacturer, with no joints allowed within 10 feet of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with **elastomeric** or **non-skinning butyl** sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate through substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

H. Seal joints with **elastomeric** or **non-skinning butyl** sealant as required for watertight construction.

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pre-tinned surface would show in finished Work.

1. Do not solder **pre-painted, or metallic-coated steel** sheet.

3.2 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with **elastomeric** or **non-skinning butyl** sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored **gutter brackets** or **straps** spaced not more than 36 inches (900 mm) apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.24 m) apart., or as recommended by the manufacturer. Install expansion joint caps at all expansion joints.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely, no more than 1/2 inch (25 mm) away from walls; locate fasteners at top and bottom and at not more than 60 inches (1500 mm) o.c. in between.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.

1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate as recommended by the Roof Manufacturer for the Wind Loads indicated.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.

1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at **16-inch (400-mm)** centers, or as recommended by the manufacturer.
2. Anchor interior leg of coping with screw fasteners and washers at **16-inch (400-mm)** centers, or as recommended by the manufacturer.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Secure in a waterproof manner. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with **elastomeric** or **non-skinning butyl** sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Use pre-fabricated pipe-penetration boots as recommended by the roof manufacturer.

2. Seal with **elastomeric** or **non-skinning butyl** sealant and fasteners to the roof panel as recommended by the Roof manufacturer. Clamp flashing to pipes penetrating roof with stainless steel drawband.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend a minimum of 4 inches (100 mm) beyond wall openings.

END OF SECTION 076220

SECTION 078410 - FIRESTOPPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes firestopping systems for joints, changes in materials, and penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

ALL firestopping products shall be submitted, installed, and documented by ONE single, qualified firestopping subcontractor, who specializes in, and whose primary focus is the installation of firestopping systems.

B. Fire rated constructions include but are not limited to the following:

1. Fire Rated Load Bearing Metal or Wood Stud Wall Assemblies
2. Fire Rated Non-Load Bearing Metal or Wood Stud Wall Assemblies
3. Fire Rated Exterior and Interior Masonry Wall Assemblies
4. Fire Rated Shaft Wall Assemblies (non-load bearing)
5. Kitchen Hood Exhaust Duct chase through Attic, to roof deck.
6. Fire Rated Floor / Ceiling Assemblies
7. Fire Rated Roof / Ceiling Assemblies

C. Examples of the above Fire Rated Assemblies may include, but are not necessarily limited to, the following:

a. Building Area Separation Walls
b. Corridor Walls
c. Walls separating Mechanical, Janitor, Closets, and other Support Spaces
d. Walls separating Assembly Spaces
e. Sprinkler Room
f. Sleeping Rooms
g. Stairwell Walls
h. Elevator Shaft Walls
i. Roof/Ceiling Assembly
j. Floor/Ceiling Assembly between Building floors.
k. Roof/Ceiling Assembly between Building Floors and Attic/Roof
l. Ceiling Assembly at Elevator shafts.
m. Ceiling Assembly at Stairwells.

D. Termination conditions may include, but are not limited to, the following:

1. Terminations of Rated Walls to exterior walls / sheathing
2. Terminations of Rated Walls to Roof Deck
3. Terminations of Rated Walls to Roof/Ceiling Assembly
4. Terminations of Rated Walls to other Rated Walls of equal or greater Fire Rating
5. Terminations of Rated Ceilings to exterior walls / sheathing
6. Terminations of Rated Ceilings to Roof Deck
7. Terminations of Rated Ceilings to Roof/Ceiling Assembly
8. Terminations of Rated Ceilings to Rated Walls of equal or greater Fire Rating

E. Penetrating items include, but are not limited to, the following:

1. Structural Penetrations
    a. Beams
    b. Bar Joists
    c. Metal Trusses
    d. Bracing
    e. Columns
    f. Miscellaneous Framing
2. Electrical Penetrations
    a. Junction Boxes
    b. Wiring
    c. Conduits
    d. Buss Ducts
3. Plumbing Penetrations
    a. Water Supply Lines
    b. Sewer Lines
    c. Venting Lines
4. Fire Protection Penetrations
    a. Sprinkler Main Lines
    b. Sprinkler Branch Lines
5. Mechanical Penetrations
    a. Exhaust Air Ducting
    b. Supply Air Ducting
    c. Return Air Ducting
    d. Mechanical Piping

F. The Contractor shall verify, locate, and coordinate the locations, types, and extents of required terminations and penetrations from a complete set of plans and specifications, and shall coordinate the same with and/or between the appropriate Trades.

1.2 RELATED DOCUMENTS

A. The Contractor shall thoroughly review the complete set of Contract Drawings for the locations, types, and extents of penetrations through these Fire Rated Assemblies, most notably but not limited to the Mechanical, Plumbing, Sprinkler, and Electrical sheets, and coordinate all trades accordingly.

B. Refer to Architectural Sheets G1.0 for locations of Fire Rated Assemblies and Smoke Partitions included in this project.

C. Related Specification Sections, as may be applicable to this project:

1. 048100 "Unit Masonry Assemblies"
2. 061000 "Rough Carpentry"
3. 061600 "Sheathing"
4. 061710 "Shop Fabricated Wood Trusses"
5. 072100 "Building Insulation, Building Wrap, and Sealants"
6. 078410 " Fire Stop Systems"
7. 081110 "Hollow Metal Doors and Frames"
8. 082110 "Flush Wood Doors"
9. 087110 "Door Hardware"
10. 088000 "Glazing"
11. 092600 "Gypsum Board Assemblies"

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are 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.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems for this Project to a single qualified installer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.

D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems **t**hat are produced by one of the following manufacturers:

1. 3M; Fire Protection Products Division.
2. A/D Fire Protection Systems Inc.
3. Hilti, Inc.
4. RectorSeal Corporation (The).
5. Tremco; Sealant/Weatherproofing Division.

6. Grace, W. R. & Co. - Conn.
7. Johns Manville.
8. Nelson Firestop Products.
9. NUCO Inc.
10. Specified Technologies Inc.
11. USG Corporation.

2.2 FIRESTOPPING

A. Compatibility: Provide through-penetration firestop systems from a single manufacturer, that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system from a single manufacturer, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

PART 3 - EXECUTION

3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing 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 firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.2 MARKING OF FIRE RATED ASSEMBLIES AND SMOKE PARTITIONS

A. Mark both sides of all fire-rated assemblies and/or smoke partitions utilizing a stencil and red paint with lettering of 4" high (minimum), and at 8'-0" on-center (maximum), at approximately 6"-12” above the ceiling line with the following designations, as is appropriate:

FIRE RATED WALL
2-HOUR

FIRE RATED WALL
1-HOUR

SMOKE PARTITION

FIRE RATED CEILING
1-HOUR

FIRE RATED CEILING
2-HOUR

SMOKE CEILING

3.3 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

END OF SECTION 078410

SECTION 078998 - RATED ASSEMBLIES & SMOKE PARTITONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes General Requirements for Construction of Fire Rated Assemblies and Smoke Assemblies utilized throughout this product. This information is provided for the reference of the Contractor, his Subcontractors, and Louisiana State Fire Marshal and Building inspectors.

B. Fire Rated Assemblies in this project may include, but are not necessarily limited to, the following:

1. Fire Rated Load Bearing Metal or Wood Stud Wall Assemblies
2. Fire Rated Non-Load Bearing Metal or Wood Stud Wall Assemblies
3. Fire Rated Exterior and Interior Masonry Wall Assemblies
4. Fire Rated Shaft Wall Assemblies (non-load bearing)
5. Kitchen Hood Exhaust Duct chase through Attic, to roof deck.
6. Fire Rated Floor / Ceiling Assemblies
7. Fire Rated Roof / Ceiling Assemblies

C. Examples of the above Fire Rated Assemblies may include, but are not necessarily limited to, the following:

1. Building Area Separation Walls
2. Corridor Walls
3. Walls separating Mechanical, Janitor, Closets, and other Support Spaces
4. Walls separating Assembly Spaces
5. Sprinkler Room
6. Sleeping Rooms
7. Stairwell Walls
8. Elevator Shaft Walls
9. Roof/Ceiling Assembly
10. Floor/Ceiling Assembly between Building floors.
11. Roof/Ceiling Assembly between Building Floors and Attic/Roof
12. Ceiling Assembly at Elevator shafts.
13. Ceiling Assembly at Stairwells.

D. Refer to Section 078410 "Firestopping Systems" for termination conditions which may include, but are not limited to the following:

1. Terminations of Rated Walls to exterior walls / sheathing
2. Terminations of Rated Walls to Roof Deck
3. Terminations of Rated Walls to Roof/Ceiling Assembly
4. Terminations of Rated Walls to other Rated Walls of equal or greater Fire Rating
5. Terminations of Rated Ceilings to exterior walls / sheathing
6. Terminations of Rated Ceilings to Roof Deck
7. Terminations of Rated Ceilings to Roof/Ceiling Assembly
8. Terminations of Rated Ceilings to Rated Walls of equal or greater Fire Rating

E. Refer to Section 078410 "Firestopping Systems" for penetrating items which may include, but are not limited to the following:

1. Structural Penetrations
    a. Beams
    b. Bar Joists
    c. Metal Trusses
    d. Bracing
    e. Columns
    f. Miscellaneous Framing
2. Electrical Penetrations
    a. Junction Boxes
    b. Wiring
    c. Conduits
    d. Buss Ducts
3. Plumbing Penetrations
    a. Water Supply Lines
    b. Sewer Lines
    c. Venting Lines
4. Fire Protection Penetrations
    a. Sprinkler Main Lines
    b. Sprinkler Branch Lines
5. Mechanical Penetrations
    a. Exhaust Air Ducting
    b. Supply Air Ducting
    c. Return Air Ducting
    d. Mechanical Piping

F. The Contractor shall verify, locate, and coordinate the locations, types, and extents of required terminations and penetrations from a complete set of plans and specifications, and shall coordinate the same with and/or between the appropriate Trades.

1.2 RELATED DOCUMENTS

A. Related Specification Sections:

1. 04810 "Unit Masonry Assemblies"
2. 06100 "Rough Carpentry"
3. 06160 "Sheathing"
4. 06171 "Shop Fabricated Wood Trusses"
5. 07210 "Building Insulation, Building Wrap, and Sealants"
6. 07841 "Through-Penetration Fire Stop Systems"
7. 08111 "Hollow Metal Doors and Frames"
8. 08211 "Flush Wood Doors"
9. 08711 "Door Hardware"
10. 08800 "Glazing"
11. 09260 "Gypsum Board Assemblies"

B. Refer to Architectural Sheets G1.0 for locations of Fire Rated Assemblies and Smoke Partitions included in this project.

C. The Contractor shall thoroughly review the complete set of Contract Drawings for the locations, types, and extents of penetrations through these Fire Rated Assemblies, most notably but not limited to the Mechanical, Plumbing, Sprinkler, and Electrical sheets, and coordinate all trades accordingly.

PART 2 - EXECUTION

2.1 U.L. TEST ASSEMBLY INSTALLATION

A. General: Fire Rated Assemblies shall be installed in accordance with the U.L. Test Listings, unless specifically modified by the Authority Having Jurisdiction (A.H.J.).

1. **Fire Rated Assemblies shall be installed continuous from exterior sheathing to exterior sheathing, from rated assembly to rated assembly, or from rated assembly to exterior wall or roof sheathing.**
2. **Fire Rated Assemblies shall not, under any circumstances, terminate to any non-rated assembly.**

3. **Terminations of Fire Rated Assemblies shall be addressed in accordance with the requirements of Section 078410 "Firestopping Systems".**

4. **Penetrations through Fire Rated Assemblies shall be addressed in accordance with the requirements of Section 078410 "Firestopping Systems".**

B. Construction Sequencing

1. In some cases, the Construction Documents may provide notes indicating construction sequencing necessary to provide access for verification and inspection of the terminations and firestopping of rated assemblies, prior to construction of adjacent, non-rated construction. However, the Contractor shall be solely responsible for the means, methods, and sequencing of the Work, as necessary to install the required Fire Rated Assemblies.

2.2 MARKING OF FIRE RATED ASSEMBLIES AND SMOKE PARTITIONS

A. Wall Assemblies:

1. Mark both sides of all fire-rated assemblies and/or smoke partitions utilizing a stencil and red paint with lettering of 4" high (minimum), and at 8'-0" on-center (maximum), at approximately 6”-12" above the ceiling line with the following designations, or, as is appropriate:

RATED WALL ASSEMBLY
2-HOUR

RATED WALL ASSEMBLY
1-HOUR

SMOKE PARTITION

B. Ceiling Assemblies:

1. Mark both sides of all fire-rated ceiling assemblies and/or smoke partitions utilizing a stencil and red paint with lettering of 4" high (minimum), and at 8'-0"x8’-0” on-center (maximum), beginning not more than 4’ from the perimeter walls, with the following designations, or, as is appropriate:

RATED CEILING ASSEMBLY
2-HOUR

RATED CEILING ASSEMBLY
1-HOUR

SMOKE CEILING

2.3 QUALITY ASSURANCE

A. Verification and Inspection:

1. Do not proceed with construction of adjacent work that will cause terminations of Fire Rated Assemblies to become concealed until each installation has been examined by the Louisiana State Fire Marshal Inspector, and the Building Inspector, as required by the authorities having jurisdiction.

2. Failure to schedule and coordinate the required inspections will result in removal of the adjacent construction, for verification purposes. Any such removal and repair work, as well as any related costs, will be sole responsibility of the Contractor.

2.4 FIELD QUALITY CONTROL

A. Where deficiencies are found, repair or replace construction or termination of Fire Rated Assemblies, so they comply with the requirements of the U.L. Test Listing.

B. Proceed with construction of adjacent of work only after inspection by the Louisiana State Fire Marshal Inspector and Building Inspector, and issuance of reports are issued, stating that installations comply with requirements.

PART 3 - U.L. TEST LISTINGS

3.0 **Refer to Specification Section 078999 "U. L. Test Assemblies" for a listing of Rated Assemblies and U.L. Design Test Reports, expected to be utilized on this project.**

END OF SECTION 078998

SECTION 078999 – RATED CONSTRUCTION TEST ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes U.L. Test Assemblies and/or Gypsum Manufacturer's Association Test Reports for Rated Assemblies utilized in compliance with the International Building Code and NFPA 101 - Life Safety Code requirements for this project.

B. U.L. Test Assemblies

1. Rated Wall Assemblies
   a. **U419 – 1 Hour Rated Wall Assembly (Metal Studs + Gypsum Board)**
   b. **U419 – 1 Hour Rated Ceiling Assembly (Metal Joists + Gypsum Board)**
   c. **U573 – 1 Hour Rated Floor/Ceiling Assembly (Metal Joists + Gyp. Board)**

1.2 RELATED WORK

A. Division 3 – Concrete (Related Sections)

B. Division 4 – Masonry (Related Sections)

C. Division 7 Sections – Thermal and Moisture Protection (Related Sections)

1. Section 078410 –Firestopping

D. Division 9 – Finishes (Related Sections)

1. Section 092600 – Gypsum Board Assemblies

E. Division 22 – Plumbing (Related Sections)

F. Division 23 – Mechanical (Related Sections)

G. Division 26 – Electrical (Related Sections)

H. Other Divisions and Technical Specification Sections as may be applicable.

1.3 MARKING OF FIRE RATED ASSEMBLIES AND SMOKE PARTITIONS

A. Mark both sides of all fire-rated assemblies and/or smoke partitions utilizing a stencil and red paint with lettering of 4" high (minimum), and at 5'-0" on-center (maximum).

Label both sides of walls at approximately 8" above the ceiling line, and at 8'-0" on-center (maximum).

Label bottom side of ceilings at 8'-0" on-center (maximum) in each direction.

FIRE RATED WALL
2-HOUR

FIRE RATED WALL
1-HOUR

SMOKE PARTITION

FIRE RATED CEILING
1-HOUR

FIRE RATED CEILING
2-HOUR

SMOKE CEILING

*** U.L. Assembly Test Report(s) and G.A. Assembly Data Follows ***

END OF SECTION

ONLINE CERTIFICATIONS DIRECTORY

Design No. U419
BXUV.U419
Fire-resistance Ratings - ANSI/UL 263

Page Bottom

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

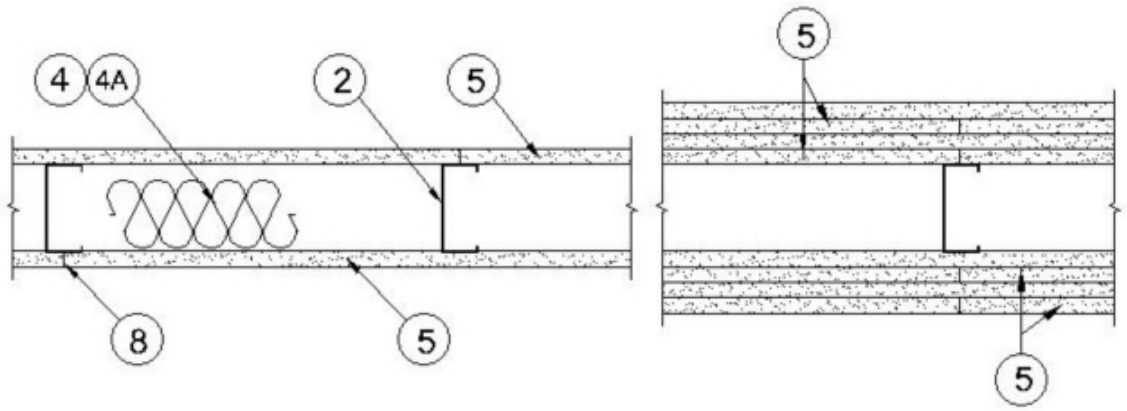
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

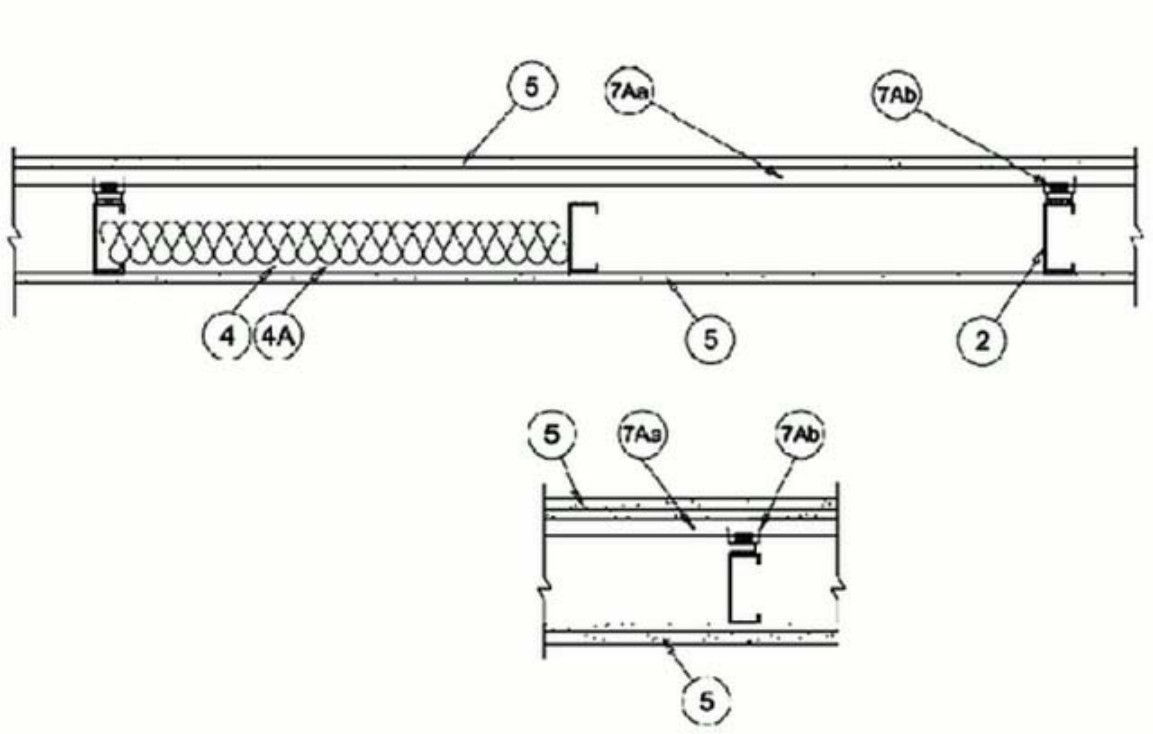
Design No. U419

May 28, 2015

Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr (See Items 4 & 5 through 5K)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**





1. **Floor and Ceiling Runners —** (Not shown) — For use with Item 2 - Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth to accommodate stud size, with min 1-1/4 in. long legs, attached to floor and ceiling with fasteners 24 in. OC max.

1A. **Framing Members* - Floor and Ceiling Runner —** Not shown - In lieu of Item 1 — For use with Item 2B, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™ Track

CRACO MFG INC — SmartTrack25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™ Track

PHILLIPS MFG CO L L C — Viper25™ Track

1B. **Framing Members* - Floor and Ceiling Runner —** Not shown - In lieu of Item 1 — For use with Item 2C, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™ Track

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track

PHILLIPS MFG CO L L C — Viper20™ Track

1C. **Framing Members*— Floor and Ceiling Runners —** (Not shown) — In lieu of Item 1 - Channel shaped, attached to floor and ceiling with fasteners 24 in. OC. max.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

1D. **Floor and Ceiling Runners —** (Not shown)—For use with Item 2A- Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, min depth to accommodate stud size, with min 1 in. long legs, attached to floor and ceiling with fasteners spaced max 24 in. OC.

1E. **Framing Members*— Floor and Ceiling Runners —** (Not shown, As an alternate to Item 1) — For use with Items 2E, 5F or 5G or 5I only, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

CLARKDIETRICH BUILDING SYSTEMS — CD ProTRAK

DMFCWBS L L C — ProTRAK

MBA METAL FRAMING — ProTRAK

RAM SALES L L C — Ram ProTRAK

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProTRAK

1F. **Framing Members* - Floor and Ceiling Runner —** Not shown - In lieu of Item 1 — For use with Item 2F, proprietary channel shaped runners, minimum width to accommodate stud size, with 1- 1/8 in. long legs fabricated from min 0.015 in. (min bare metal thickness) galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

SUPER STUD BUILDING PRODUCTS — The Edge

1G. **Framing Members* - Floor and Ceiling Runner —** For use with Item 2G, proprietary channel shaped runners, minimum width to accommodate stud size attached to floor and ceiling with fasteners 24 in. OC max.

STUDCO BUILDING SYSTEMS — CROCSTUD Track

1H. **Floor and Ceiling Runners —** (Not shown) — Channel shaped, fabricated from min 0.02 in. galv steel, min width to accommodate stud size, with min 1 in. long legs, for use with studs specified below and fabricated from min 0.02 in. galv steel or thicker, attached to floor and ceiling with fasteners spaced max 24 in. OC.

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track VT100.

1I. **Framing Members*— Floor and Ceiling Runners —** (Not shown, As an alternate to Item 1) — For use with Items 2H, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

TELLING INDUSTRIES L L C — TRUE-TRACK™

1J. **Framing Members* - Floor and Ceiling Runner —** Not shown - In lieu of Item 1 — For use with Item 2I, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

TELLING INDUSTRIES L L C — Viper25™ Track

1K. **Framing Members* - Floor and Ceiling Runner —** Not shown - In lieu of Item 1 — For use with Item 2J, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

TELLING INDUSTRIES L L C — Viper20™ Track

2. **Steel Studs —** Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

2A. **Steel Studs —** (As an alternate to Item 2, For use with Items 5B, 5E, 5H, 5J and 5K) Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min depth, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.

2B. **Framing Members* - Steel Studs —** (As an alternate to Item 2, For use with Items 5C, 5I or 5K) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a 1/2 in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™

CRACO MFG INC — SmartStud25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™

PHILLIPS MFG CO L L C — Viper25™

2C. **Framing Members* - Steel Studs —** Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™

PHILLIPS MFG CO L L C — Viper20™

2D. **Framing Members*— Steel Studs —** In lieu of Item 2 - Channel shaped studs, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

2E. **Framing Members*— Steel Studs —** (Not shown, As an alternate to Item 2) —For use with Items 5F or 5G or 5I or 5K only, channel shaped studs, min depth as indicated under Item 5F, 5G or 5I, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

CLARKDIETRICH BUILDING SYSTEMS — CD ProSTUD

DMFCWBS L L C — ProSTUD

MBA METAL FRAMING — ProSTUD

RAM SALES L L C — Ram ProSTUD

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProSTUD

2F. **Framing Members* - Steel Studs —** Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, minimum width indicated under Item 5, 1-1/4 in. deep fabricated from min 0.015 in. (min bare metal thickness) galvanized steel. Studs 3/8 in. to 3/4 in. less in lengths than assembly heights.

SUPER STUD BUILDING PRODUCTS — The Edge

2G. **Framing Members* - Steel Studs —** Not shown - In lieu of Item 2 - proprietary channel shaped studs, minimum width indicated under Item 5, Studs to be cut 3/8 to 3/4 in less than the assembly height.

STUDCO BUILDING SYSTEMS — CROCSTUD

2H. **Framing Members*— Steel Studs —** (Not shown, As an alternate to Item 2) — Fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

TELLING INDUSTRIES L L C — TRUE-STUD™

2I. **Framing Members* - Steel Studs —** (As an alternate to Item 2, For use with Items 5C or 5L or 5K) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a ½ in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

TELLING INDUSTRIES L L C — Viper25™

2J. **Framing Members* - Metal Studs —** Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights

TELLING INDUSTRIES L L C — Viper20™

2K. **Framing Members*— Steel Studs —** As an alternate to Item 2 - For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

EB MéTAL INC — EB Stud

2L. **Framing Members* — Steel Studs —** As an alternate to Item 2 - For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

OLMAR SUPPLY INC — PRIMESTUD

2M. **Framing Members* — Steel Studs —** As an alternate to Item 2 - For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

MARINO/WARE, DIV OF WARE INDUSTRIES INC — StudRite™

3. **Wood Structural Panel Sheathing —** (Optional, For use with Item 5 Only.) - (Not Shown) - 4 ft wide, 7/16 in. thick oriented strand board (OSB) or 15/32 in. thick structural 1 sheathing (plywood) complying with DOC PS1 or PS2, or APA Standard PRP-108, manufactured with exterior glue, applied horizontally or vertically to the steel studs. Vertical joints centered on studs, and staggered one stud space from wallboard joints. Attached to studs with flat-head self-drilling tapping screws with a min. head diam. of 0.292 in. at maximum 6 in. OC. in the perimeter and 12 in. OC. in the field. When used, fastener lengths for gypsum panels increased by min. 1/2 in.

4. **Batts and Blankets* —** (Required as indicated under Item 5) — Mineral wool batts, friction fitted between studs and

runners. Min nom thickness as indicated under Item 5. See **Batts and Blankets (BKNV or BZJZ) Categories** for names of Classified companies.

4A. **Batts and Blankets* —** (Optional) — Placed in stud cavities, any glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. See **Batts and Blankets (BKNV or BZJZ) Categories** for names of Classified companies.

4B. **Batts and Blankets* —** For use with Item 5K. Placed in stud cavities, any min. 3-1/2 in. thick glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. See **Batts and Blankets (BKNV or BZJZ) Categories** for names of Classified companies.

5. **Gypsum Board* —** Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 1 hr, 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Items 2, 2C, 2D, 2F and 2G	No. of Layers & Thkns of Panel	Min Thkns of Insulation (Item 4)
1	3-1/2	1 layer, 5/8 in. thick	Optional
1	2-1/2	1 layer, 1/2 in. thick	1-1/2 in.
1	1-5/8	1 layer, 3/4 in. thick	Optional
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
2	3-1/2	1 layer, 3/4 in. thick	3 in.
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	2 layers, 3/4 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional
4	2-1/2	2 layers, 3/4 in. thick	2 in.

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR; WRC, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX or WRC; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type SCX, SGX, SHX, WRX, IP-X1, AR, C, WRC, FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX, WRC or; 3/4 in. thick Types IP-X3 or ULTRACODE

When Item 7B, Steel Framing Members*, is used, Nonbearing Wall Rating is limited to 1 Hr. Min. stud depth is 3-1/2 in., min. thickness of insulation (Item 4) is 3 in., and two layers of gypsum board panels (1/2 in. or 5/8 in. thick) shall be attached to furring channels as described in Item 6. One layer of gypsum board panels (1/2 in. or 5/8 in. thick) attached to opposite side of stud without furring channels as described in Item 6.

5A. **Gypsum Board* —** (As an alternate to Item 5) — 5/8 in. thick, 24 to 54 in. wide, applied horizontally as the outer layer to one side of the assembly. Secured as described in Item 6.

CGC INC — Type SHX.

UNITED STATES GYPSUM CO — Type FRX-G, SHX.

USG MEXICO S A DE C V — Type SHX.

5B. **Gypsum Board* —** (Not Shown) - As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 in or ¾ in. thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 in. or ¾ in. may be used as alternate to all 5/8 in. or ¾ in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 in. or ¾ in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Gypsum board secured to 20 MSG steel studs Item 2A with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. To be used with Lead Batten Strips (see Item 11) or Lead Discs or Tabs (see Item 12).

RAY-BAR ENGINEERING CORP — Type RB-LBG

5C. **Gypsum Board* —** (For Use With Item 2B) Rating Limited to 1 Hour. 5/8 in. thick, 48 in. wide, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. (Vertical Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. Vertical joints are to be centered over studs and staggered one stud cavity on opposite sides of studs. (Horizontal Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. All horizontal joints are to be backed as outlined under section VI of Volume 1 in the Fire Resistive Directory.

CGC INC — Type SCX.

UNITED STATES GYPSUM CO — Type SCX, SGX.

USG MEXICO S A DE C V — Type SCX.

5D. **Gypsum Board* —** (As an alternate to Item 5) — 5/8 in. thick, 48 in. wide, applied vertically or horizontally. Secured as described in Item 6. For use with Items 1 and 2 only.

CGC INC — Type USGX.

UNITED STATES GYPSUM CO — Type USGX.

USG MEXICO S A DE C V — Type USGX.

5E. **Gypsum Board* —** (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or No. 6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.

NEW ENGLAND LEAD BURNING CO INC, DBA NELCO — Nelco

5F. **Gypsum Board* —** (As an alternate to Item 5) — For use with Items 1E and 2E and limited to 1 Hour Rating only, Gypsum panels with beveled, square or tapered edges, applied vertically, and fastened to the steel studs with 1 in. long Type S screws spaced 8 in. OC along vertical and bottom edges and 12 in. OC in the field. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Steel stud depth shall be a minimum 3-5/8 in.

UNITED STATES GYPSUM CO — 5/8 in. thick Type SCX, SGX.

5G. **Gypsum Board* —** (As an alternate to Item 5) — For use with Items 1E and 2E only, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally, as specified in the table below and fastened to the steel studs as described in Item 6. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Item 2E	No. of Layers & Thickness of Panel	Min Thkns of Insulation (Item 4)
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR;, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type SCX, SGX, SHX, IP-X1, AR, C, , FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

5H. **Gypsum Board* —** (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 or 3/4 in thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 or 3/4 in. may be used as alternate to all 5/8 or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Gypsum board secured to 20 MSG steel studs Item 2B with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 11A) or Lead Discs (see Item 12A).

MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

5I. **Gypsum Board* —** (As an alternate to Item 5) - Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 5. Steel stud minimum depth shall be as indicated in Item 5.

CGC INC — Type ULX

UNITED STATES GYPSUM CO — Type ULX

USG MEXICO S A DE C V — Type ULX

5J. **Gypsum Board* —** (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

5K. **Gypsum Board* —** (Not Shown) - (As an alternate to Item 5) - Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) need not be

staggered. The number of layers for the 1 hr, 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Items 2 through 2L	No. of Layers & Thkns of Panel	Min Thkns of Insulation (Item 4B)
1	3-5/8	1 layer, 5/8 in. thick	3-1/2 in.
2	1-5/8	2 layers, 5/8 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional

UNITED STATES GYPSUM CO — 5/8 in. thick Type ULIX

6. **Fasteners —** (Not shown) — For use with Items 2 and 2F - Type S or S-12 steel screws used to attach panels to studs (Item 2) or furring channels (Item 7). **Single layer systems:** 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 8 in. OC when panels are applied horizontally, or 8 in. OC along vertical and bottom edges and 12 in. OC in the field when panels are applied vertically. **Two layer systems:** First layer- 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels or 2-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC with screws offset 8 in. from first layer.**Three-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in., 5/8 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below. **Four-layer systems:** First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 24 in. OC. Fourth layer- 2-5/8 in. long for 1/2 in. thick panels or 3 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below.

6A. **Fasteners —** (Not shown) - For use with Item 5K- Type S or S-12 steel screws used to attach panels to studs or furring channels (Item 7). Single layer systems: 1 in. long screws, spaced 8 in. OC when panels are applied horizontally, or 8 in. OC along vertical and bottom edges and 12 in. OC in the field when panels are applied vertically. Two layer systems: First layer- 1 in. long screws, spaced 16 in. OC. Second layer- 1-5/8 in. screws, spaced 8 in. OC with screws offset 8 in. from first layer. Three-layer systems: First layer- 1 in. long screws, spaced 24 in. OC. Second layer- 1-5/8 in. long screws, spaced 24 in. OC. Third layer- 2-5/8 in. long screws, spaced 8 in. OC. Screws offset min 6 in. from layer below. Four-layer systems: First layer- 1 in. long screws, spaced 24 in. OC. Second layer- 1-5/8 in. long screws, spaced 24 in. OC. Third layer- 2-5/8 in. long screws, spaced 24 in. OC. Fourth layer- 3 in. long screws, spaced 8 in. OC. Screws offset min 6 in. from layer below.

7. **Furring Channels —** (Optional, not shown, for single or double layer systems) — Resilient furring channels fabricated from min 25 MSG corrosion-protected steel, spaced vertically a max of 24 in. OC. Flange portion attached to each intersecting stud with 1/2 in. long Type S-12 steel screws. Not for use with Item 5A and 5E.

7A. **Framing Members* —** (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to studs with No. 8 x 9/16 in. minimum self-drilling, S-12 steel screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels.

PAC INTERNATIONAL INC — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75).

7B. **Framing Members* —** (Optional, Not Shown) — As an alternate to Item 7, for single or double layer systems, furring channels and Steel Framing Members on only one side of studs as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Batts and Blankets placed in stud cavity as described in Item 5. Two layers of gypsum board attached to furring channels as described in Item 5. Not for use with Item 5A and 5E.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Ba) to one side of studs (Item 2) only. Clips spaced 48 in. OC., and secured to studs with two No. 8 x 2-1/2 in. coarse drywall screws, one through the hole at each end of the clip. Furring channels are friction fitted into clips.

KINETICS NOISE CONTROL INC — Type Isomax

7C. **Framing Members* —** (Not Shown) — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. 2-3/8 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members* —** Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. GENIECLIPS secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips.

PLITEQ INC — Type GENIECLIP

7D. **Steel Framing Members —** (Optional, Not Shown)* - Furring channels and resilient sound isolation clip as described below:

a. **Furring Channels —** Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and secured together with four self-tapping No. 8x1/2 Self Drilling screws (2 per side 1 in. and 4 in. from overlap edge). Gypsum board attached to furring channels as described in Item 4. Side joint furring channels shall be attached to studs with RESILMOUNT Sound Isolation Clips - located approximately 2 in. from each end of length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 8 in. OC, approximately 1/2 in. from joint edge. Not for use with Item 5A and 5E.

b. **Steel Framing Members* —** Resilient sound isolation clip used to attach furring channels (Item 7Da) to studs. Clips spaced 24 in. OC., and secured to studs with No. 10 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips.

STUDCO BUILDING SYSTEMS — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

8. **Joint Tape and Compound —** Vinyl or casein, dry or premixed joint compound applied in two coats to joints and screw heads of outer layers. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Paper tape and joint compound may be omitted when gypsum panels are supplied with a square edge.

9. **Siding, Brick or Stucco —** (Optional, not shown) — Aluminum, vinyl or steel siding, brick veneer or stucco, meeting the requirements of local code agencies, installed over gypsum panels. Brick veneer attached to studs with corrugated metal wall ties attached to each stud with steel screws, not more than each sixth course of brick.

10. **Caulking and Sealants* —** (Optional, not shown) — A bead of acoustical sealant applied around the partition perimeter for sound control.

UNITED STATES GYPSUM CO — Type AS

11. **Lead Batten Strips —** (Not Shown, For Use With Item 5B) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5B) and optional at remaining stud locations. Required behind vertical joints.

11A. **Lead Batten Strips —** (Not Shown, For Use With Item 5H) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations.

12. **Lead Discs or Tabs —** (Not Shown, For Use With Item 5B) - Used in lieu of or in addition to the lead batten strips (Item 11) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 5B) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

12A. **Lead Discs —** (Not Shown, for use with Item 5H) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

13. **Lead Batten Strips —** (Not Shown, For Use With Item 5E) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5E) and optional at remaining stud locations.

14. **Lead Tabs —** (Not Shown, For Use With Item 5E) 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 5E) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2015-05-28

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BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

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See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States

Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design Criteria and Allowable Variances

Design No. **L573**

June 30, 2025

Unrestrained Assembly Rating — 1 Hr.
This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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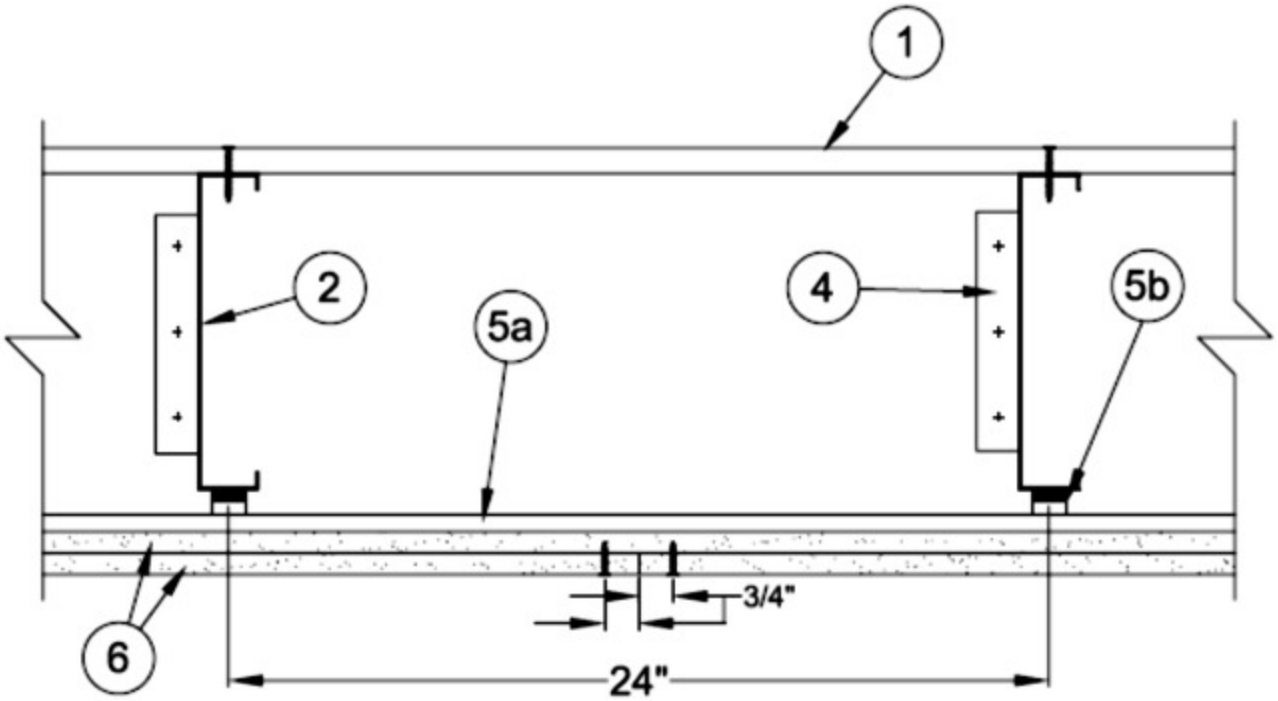

1. **Flooring System —** The flooring system shall consist of the following:

System No. 1

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

System No. 2

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Floor - Mineral and Fiber Board* — Min 1/2 in. thick, supplied in sizes ranging from 3 ft by 4 ft to 8 ft by 12 ft. All joints to be staggered a min of 12 in. with adjacent sub-floor joints.

HOMASOTE CO — Type 440-32 Mineral and Fiber Board

System No. 3

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1100 psi. Mixture shall consist of 6.8 gal of water to 80 lbs of floor topping mixture to 1.9 cu ft of sand.

HACKER INDUSTRIES INC — Firm-Fill Gypsum Concrete, Firm-Fill 2010, Firm-Fill 3310, Firm-Fill 4010, Firm-Fill High Strength, Gyp-Span Radiant

Floor Mat Materials* - (Optional) — Floor mat material nom 1/8 in. (3mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 3/4 in. (19mm)

HACKER INDUSTRIES INC — FIRM-FILL SCM 125

Alternate Floor Mat Materials - (Optional) — Floor mat material nom 1/4 in. (6mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1 in. (25mm)

HACKER INDUSTRIES INC — Types FIRM-FILL SCM 250 and FIRM-FILL SCM 250+

Alternate Floor Mat Materials - (Optional) — Floor mat material nom 3/8 in. (10mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/4 in. (32mm)

HACKER INDUSTRIES INC — Types FIRM-FILL SCM 400 and FIRM-FILL SCM 400+

Alternate Floor Mat Materials - (Optional) — Floor mat material nom 3/4 in. (19mm) thick loose laid over the subfloor. Floor topping thickness shall be a min of 1-1/2 in. (38mm)

HACKER INDUSTRIES INC — Types FIRM-FILL SCM 750 and FIRM-FILL SCM 750+

System No. 4

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

MAXXON CORP — Types Maxxon Standard and Maxxon High Strength

Floor Mat Materials* - (Optional) — Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

MAXXON CORP — Type Encapsulated Sound Mat.

Floor Mat Reinforcement - (Optional) Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat material.

— Crack Suppression Mat (CSM) or Maxxon Reinforcement (MR)

Metal Lath — (Optional)- 3/8 in. expanded galvanized steel diamond mesh, 3.4 lbs/sq yd placed over the floor mat material.

Fiber Glass Reinforcement — (Optional) - 0.015 in. thick PVC coated non-woven fiberglass mesh, 0.368 lbs./sq. yd loose laid over the floor mat material.

System No. 5

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or non-veneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

FORMULATED MATERIALS LLC — Types FR-25, FR-30, SiteMix, and Treadstone Advantage

Floor Mat Material* — (Optional) Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.

FORMULATED MATERIALS LLC — Types M1, M2, M3, Elite, Duo, R1, and R2

System No. 6

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Vapor Barrier — (Optional) - Nom 0.010 in. thick commercial asphalt saturated felt.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a minimum compressive strength of 1800 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
UNITED STATES GYPSUM CO — Types LRK, HSLRK, CSD

USG MEXICO S A DE C V — Types LRK, HSLRK, CSD

Floor Mat Materials* — - (Optional) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
UNITED STATES GYPSUM CO — Types SAM, LEVELROCK® Brand Sound Reduction Board, LEVELROCK® Brand Floor Underlayment SRM-25

Alternate Floor Mat Materials* — (Optional) - Nom 3/8 in. thick floor mat material loose laid over the subfloor.
GRASSWORX L L C — Type SC50

System No. 7

Subflooring — Min 15/32 in. thick wood structural panels, min grade "C-D" or "Sheathing". Face grain of plywood or strength axis of panels to be perpendicular to the joists with joints staggered.

Vapor Barrier — (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

Vapor Barrier — (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

Finish Flooring* — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

Floor Mat Materials* — (Optional) - Nom. 1/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

KEENE BUILDING PRODUCTS CO INC — Type Quiet Qurl 55/025 and Quiet Qurl 55/025 N

Alternate Floor Mat Materials* — (Optional) - Floor mat material Nom. 3/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

KEENE BUILDING PRODUCTS CO INC — Type Quiet Qurl 60/040 and Quiet Qurl 60/040 N

Alternate Floor Mat Materials* — (Optional) - Floor mat material Nom. 3/4 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 1-1/2 in.

KEENE BUILDING PRODUCTS CO INC — Type Quiet Qurl 65/075, Quiet Qurl 65/075 N

Alternate Floor Mat Materials* — (Optional) - Floor mat material Nom. 1/8 in. thick loose laid over the subfloor. Floor topping thickness shall be a minimum of 3/4 in.

KEENE BUILDING PRODUCTS CO INC — Type Quiet Qurl 52/013 and Quiet Qurl 52/013 N

Alternate Floor Mat Materials* — (Optional) - Floor mat material Nom. 1/4 in. entangled net core with a compressible fabric attached to the bottom loose laid over the subfloor. Floor topping thickness shall be a minimum of 1 in.

KEENE BUILDING PRODUCTS CO INC — Quiet Qurl 55/025 MT and Quiet Qurl 55/025 N MT

System No. 8

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

ARCOSA SPECIALTY MATERIALS — AccuCrete® Types NexGen, Green, Prime and PrePour, AccuRadiant®, AccuLevel® Types G40, G50 and SD30

DEPENDABLE LLC — GSL M3.4, GSL K2.6, GSL-CSD or GSL RH

Floor Mat Material* — (Optional) - Floor mat material nominal 2 - 9.5 mm thick loose laid over the subfloor. Floor topping shall be a min of 3/4 in.

ARCOSA SPECIALTY MATERIALS — AccuQuiet® Types D13, D-18, D25, DX38, EM.125, EM.125S, EM.250, EM.250S, EM.375, EM.375S, EM.750, and EM.750S.

System No. 9

Subflooring — Min 23/32 in. thick T&G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. Staples having equal or greater withdrawal and lateral resistance strength may be substituted for the 6d nails.

Gypsum Board* — One layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists. Gypsum board secured with 1 in. long No. 6 Type W bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches from the joints of the subfloor.

GEORGIA-PACIFIC GYPSUM L L C — Type DS

Floor Mat Materials* — (As an alternate to the single layer gypsum board) - Floor mat material loose laid over the subfloor.

MAXXON CORP — Type Encapsulated Sound Mat.

Gypsum Board* — (For use when floor mat is used) Two layers of nom 5/8 in. thick, 4 ft wide gypsum board, installed with long dimension perpendicular to joists on top of the floor mat material. Gypsum board secured to each other with 1 in. long No. 6 Type G bugle head steel screws spaced 12 in. OC and located a min of 1-1/2 in. from side and end joints. The joints of the gypsum board are to be staggered a minimum of 12 inches in between layers and from the joints of the subfloor.

GEORGIA-PACIFIC GYPSUM L L C — Type DS

System No. 10

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 1 in. thickness of floor topping mixture having a min compressive strength of 4500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.
SIKA DEUTSCHLAND GMBH — Type SCHONOX AP Rapid Plus

System No. 11

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Vapor Barrier — (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

Vapor Barrier — (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies. Refer to the manufacturer's instructions accompanying the material and/or contact the manufacturer's technical support for specific mix design and minimum thickness recommended for use with eligible floor mat(s).

Floor Mat Materials* — (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.
Freudenberg Performance Materials LP — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750 and 750 Plus.

Floor Mat Reinforcement — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

Metal Lath — (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

Fiberglass Mesh Reinforcement — (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

System No. 12

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1000 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

ALPHAGYP, LLC — Type AlphaGyp

System No. 13

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Floor Mat Materials* — (Optional) — Any Floor Mat Material bearing the UL Classification Marking as to Fire Resistance. See Floor Mat Materials (CCQU) category for names of Classified Companies. Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

Metal Lath — (Optional) — 3.4 lbs/sq yd expanded galvanized steel diamond lath loose laid over the floor mat material. Refer to manufacturer's instructions regarding installation recommendations.

Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

LATICRETE INTERNATIONAL INC — Type LAT

System No. 14

Subflooring — Min 3/4 in. thick plywood, min grade "Underlayment". Face grain of plywood to be perpendicular to joists with end joints staggered. Long edges to be T & G. Plywood or nonveneer APA rated panels secured to joists with construction adhesive and 1-5/16 in. long Type S12 steel screw spaced 12 in. OC along each joist. Screw located 5/8 in. from end joints and 1 in. for side joints. Adhesive applied to top of joists prior to placing of plywood.

Finish Flooring - Floor Topping Mixture* — Min 1 in. thickness of floor topping mixture having a min compressive strength of 2500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

Apex Minerals LLC — Type Apex Multi Underlayment

2. **Steel Joists —** The joists are channel-shaped, min 9-3/8 in. deep, with min 1-5/8 in. wide flanges and 1/2 in. long stiffening flanges. The joists are fabricated from min No. 16 MSG galv steel. Min yield strength of steel is either 33,000 or 40,000 psi with corresponding max working stress of 20,000 and 24,000 psi. Joists spaced max 24 in. OC. At joist splices bearing on supports, joists are connected using an overlapping section of 1 ft long joist, with eight 1/2 in. long Type S12 pan head screws.

3. **Joist Bridging - (Not Shown) —** Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of joist sections cut to length and placed between outer supports, adjacent to openings and at mid-span with 8 ft. OC max spacing. Bridging channels are screw-attached at each end to joist web using angle clips. V-bracing of 1-1/2 in. by 20-ga galvanized steel screw-attached to bottom joist flange between bridging channels.

4. **Angle Clips —** No. 14 MSG, 8 in. long steel angles with 2 in. legs and four 1/8 in. diam holes spaced 2 in. OC and located 1 in. from the ends and 3/4 in. from long edge. Secured to header and joists with eight 1/2 in. long S12 pan head screws.

5. **Steel Framing Members* - (Not Shown) —** Furring channels and **Steel Framing Members*** as described below:
a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 16 in. OC perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 24 in. OC and secured to each joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clip for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clip for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel.
PAC INTERNATIONAL L L C — Types RSIC-1, RSIC-1 (2.75).

5A. **Steel Framing Members* —** (Not Shown) — Furring channels and **Steel Framing Members*** as described below:
a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 16 in. OC perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced 24 in. OC and secured to each joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel.
PLITEQ INC — Type GENIECLIP

5B. **Alternate Steel Framing Members* —** (Not shown) As an alternate to items 5 and 5A, furring channels and **Steel Framing Members** as described below.
a. **Furring Channels —** Formed of No. 25 MSG galv steel, 2-5/8 in. wide by 7/8 in deep, spaced 16 in OC, perpendicular to joists. Channels secured to joists as described in Item b.

b. **Steel Framing Members* —** Used to attach furring channels (Item a) to joists (Item 2). Clips spaced at 48" OC and secured to the bottom of the joists with one 2 in. Coarse Drywall Screw with 1 in. diam washer through the center hole. Furring channels are then friction fitted into clips. Ends of channels are overlapped 6" and tied together with double strand of No. 18 AWG galvanized steel wire.Additional clips are required to hold the Gypsum Butt joints as described in Item 6.
STUDCO BUILDING SYSTEMS — RESILMOUNT Sound Isolation Clips - Type A237R

5C. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5.
a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 16 in. OC, perpendicular to joists. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Gypsum board (Item 6) butted end joints centered on the furring channels, each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels —** 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to joists, friction-fitted into the channel caddy on the Steel Framing Members (Item 5Cc) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Steel Framing Members* —** Spaced 48 in. OC. max along joist, and secured to the joist on alternating joists with two, No. 10-16 TEK screws through mounting holes on the hanger bracket.
PAC INTERNATIONAL L L C — Type RSIC-SI-CRC EZ Clip

5D. **Steel Framing Members* —** (Optional, Not Shown) — As an alternate to Item 5.
a. **Furring Channels —** Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 16 in. OC perpendicular to joists and friction fit into Steel Framing Members (Item 5Db). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Gypsum board (Item 6) butted end joints centered on the furring channels. Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Steel Framing Members* —** Used to attach furring channels (Item 5Da) to joists. Clips spaced 48 in. OC and secured along joist webs at each furring channel intersection with min. 3/4 in. long self-drilling No. 10-16 TEK screws through each of the provided hole locations. Furring channels are friction fitted into clips.
PAC INTERNATIONAL L L C — Type RSIC-S1-1 Ultra

6. **Gypsum Board* —** Two layers of 5/8 in. thick by 48 in. wide sheets installed with long dimension perpendicular to furring channels. Upper layer attached to furring channels using 1 in. long, Type S bugle head steel screws spaced 24 in. OC and located 5/8 in. from butt joint and 2 in. from long edges. Butt joints to be centered under furring channels. Face layer attached to furring channels through upper layer with 1-5/8 in. long Type S bugle head steel screws spaced a max. 12 in. OC in the field and 1 in. from side edges of boards. All joints in face layer boards to be offset from joints in upper layer a min. of 16 in. Butt joints of face layer to occur between furring channels with each end of butted boards attached to upper layer board with 1-1/2 in. long Type G bugle head steel screws spaced 8 in OC along the joint and 3/4 in. from board ends. When **Steel Framing Members** (Item 5B) are used, base layer gypsum board is installed with long dimensions perpendicular to furring channels. Gypsum board secured to furring channels with nom 1 in. long Type S bugle-head steel screws spaced 8 in. OC in the field of the board. Gypsum board butted end joints shall be staggered minimum 48 in. and centered over main furring channels. At the gypsum board butt joints, each end of each gypsum board shall be supported by a single length of furring channel equal to the width of the gypsum board plus 3 in. on each end. The two support furring channels shall be spaced approximately 3 in. in from joint. Screw spacing along the gypsum board butt joint and along both additional channels shall be 8 in. OC. Additional screws shall be placed in the adjacent section of gypsum board into the aforementioned 3 in. extension of the extra butt joint channels as well as into the main channel that runs between. Butt joint furring channels shall be attached with one RESILMOUNT Sound Isolation Clip at each end of the channel. Face layer secured as described above.
When **Steel Framing Members** (Item 5C) are used, Two layers nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 6. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 5D) are used, Two layers nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 6. Butt joints staggered minimum 24 in. OC.

AMERICAN GYPSUM CO — Types AG-C, AGX-C

CERTAINTEED GYPSUM INC — Type C

CGC INC — Type C

CERTAINTEED GYPSUM INC — Types LGFC-C, LGFC-C/A

GEORGIA-PACIFIC GYPSUM L L C — Type 5

GEORGIA-PACIFIC GYPSUM L L C — Type TG-C

NATIONAL GYPSUM CO — Types FSK-C, FSW-C, FSW-G

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types C, PG-C

UNITED STATES GYPSUM CO — Type C

USG MEXICO S A DE C V — Type C

7. **Finishing System —** (Not shown) Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum board.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2025-06-30

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SECTION 079000 – BUILDING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior and Interior expansion, contraction, and construction joints within buildings.
   2. Exterior and Interior joints in where dissimilar materials meet.
   3. Exterior joints around storefront, windows & openings.
   4. Interior paintable caulking for closing gaps, cracks, joints, etc.

B. **For joints in Rated Walls, Floors, or Ceilings refer to Specification Section 078410 "Firestopping Systems".**

1.2 QUALITY ASSURANCE

A. Obtain each type of sealant through a single source manufacturer.

B. Installer Qualifications: Experienced installer specializing in installing joint sealants similar in material, design and extent of those indicated for this project for at least two (2) years.

1.3 SUBMITTALS

A. Submit product data for each type of sealant specified or proposed for use on this project.

B. Submit manufacturer's full range of color options, including special order colors.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project Site in original, unopened containers with labels indicating product manufacturer, designation, expiration date, etc.

B. Store and handle materials as recommended by manufacturer. Store materials out of weather exposure and in protected interior space. Protect from freezing.

C. Do not install joint sealants or proceed with ongoing installation under any of the following conditions:

1. When ambient temperature is below 40 deg F or outside of range recommended by manufacturer.
2. When raining, or under wet conditions.

D. Inspect all joints for satisfactory width and configuration, do not proceed with installation until any discrepancies are remedied. Proceeding with installation signifies acceptance of existing conditions.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

A. Expansion joints in masonry construction and at joints of dissimilar construction: One-part where required for differential movement up to 25% is expected or two-part polyurethane where required for differential movement up to 50 % is expected.

B. At non-porous materials where dissimilar materials meet: Single component Silicone.

C. Products: Subject to compliance with requirements, provide one of the following:

1. Single Component Polyurethane:
    a. Sonneborn NP-1
    b. Pecora Dynatrol I XL
2. Two Component Polyurethane:
    a. Sonneborn NP-2
    b. Pecora Dynatrol II
3. Single Component Silicone:
    a. Sonneborn Omniseal
    b. Pecora 311 NS
4. Acrylic Latex: (Painting caulk to fill gaps)
    a. Sonneborn Sonolac
    b. Pecora AC 20 +

D. Color of sealant materials to be selected by Architect from available full-line manufacturer’s color chart.

2.2 JOINT-SEALANT BACKER MATERIALS

A. Provide joint backer materials which are non-staining, and compatible with joint sealants, primers, and other materials used in installation.

B. Round backer rod of diameter and density required to control sealant depths: ASTM D 5249, Type 1.

2.3 PRIMERS

A. Compatible with sealant materials and as recommended by manufacturer. Clear in color.

B. Perform on-site field tests to determine suitability of product prior to installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all joints for compliance with design drawings and Manufacturer recommendations.

B. Examine on-site with installer present and proceed with installation only when any discrepancies have been remedied.

C. **At the exterior side of Precast Concrete Walls, install Building Joint Sealants prior to installation of Direct Applied Synthetic Stucco Finish Coat.**

3.2 PREPARATION

A. Surface clean all joints, removing debris, foreign matter, dirt, etc.

B. Fill voids with backer rod to required depth for sealant material.

C. Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer based upon actual preconstruction field tests.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with manufacturer's written installation instructions regarding mixing and application unless more stringent instructions apply.

B. Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Install backer material to support sealants during application and curing and at position to produce cross-sectional shapes and depths of installed sealants relative to joint widths that will allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture or tear backer materials.
3. Remove wet backer materials and replace with dry material prior to installation of joint sealant.

D. Install sealant materials in accordance with written manufacturer's instructions and comply with the following:

1. Place sealants so they directly contact and fill fully joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Immediately after sealant application and before skinning or curing begins, tool sealant joints to form smooth, uniform beads and conform with the following:

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents and methods approved in writing manufacturer.

3.4 CLEANING

A. Clean off all excess sealants, sealant smears, etc. adjacent to joints as work progresses by methods and cleaning agents approved by sealant manufacturer.

3.5 PROTECTION

A. Protect all joint sealants during and after curing and prevent contamination with debris, dirt, etc. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sections and replace with new. Repair areas to be indistinguishable from original work.

END OF SECTION 079000

SECTION 081110 - STANDARD STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes standard hollow-metal steel doors and frames.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, and finishes for each type of steel door and frame specified.

B. Shop Drawings: Provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those indicated on the Drawings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, and/or crated to provide protection during transit and Project-site storage. Do not use non vented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ceco Door Products; an ASSA ABLOY Group Company.
2. Republic Builders Products Company.
3. Steelcraft; an Ingersoll-Rand Company.
4. Amweld
5. Curries
6. Mesker Door

7. Prior Approved manufacturers, which are submitted in accordance with the requirements of the Contract Documents, deemed to be equal, and approved prior to the issuance of the final Addendum.

2.2 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation. Factory prepare all surfaces to receive paint.

B. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

C. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.

E. Glazing: Comply with requirements in Division 8 Section "Glazing."

2.3 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces. Comply with ANSI A250.8.

B. Exterior Doors: Face sheets fabricated from **0.053-inch thick (16 gauge) galvanized (G90)**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. **Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless)**.
2. Core Construction: Manufacturer's standard **polyurethane core, foam-filled after door fabrication**, that produces doors complying with ANSI A250.8.

3. Vertical Edges for Single-Acting Doors: Square edge.
4. Top and Bottom Edges: Closed and sealed with flush ~~or inverted~~ 0.042-inch thick end closures or channels of same material as face sheets.

C. Interior Doors between Conditioned and Un-conditioned spaces: Face sheets fabricated from **0.046-inch thick (18 gauge) galvanized (A60)**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. **Level 3 and Physical Performance Level (Heavy Duty), Model 2 (Seamless)**.
2. Core Construction: Manufacturer's standard **polyurethane core, foam-filled after door fabrication**, that produces doors complying with ANSI A250.8.

3. Vertical Edges for Single-Acting Doors: Square edge.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

D. Interior Doors: Face sheets fabricated from **0.046-inch thick (18 gauge) galvanized (A60)**, metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Core Construction: Manufacturer's standard kraft-paper honeycomb core that produces doors complying with ANSI A250.8.

2. Vertical Edges for Single-Acting Doors: Square edge.
3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch thick end closures or channels of same material as face sheets.

2.4 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

B. Exterior Frames at Precast Conc Walls: Fabricated from metallic-coated steel sheet.

1. **Fabricate frames with mitered and welded face corners with seamless face joints.**

2. **Frames for Level 3 Exterior Steel Doors: 0.067-inch thick (14 gauge) galvanized (G90), metallic-coated steel sheet.**

3. **At Exterior Precast Concrete walls with interior metal stud and gypsum board finish, provide frame sized 11-3/4" throat / 12-3/4" overall to allow stud and gypsum board to set into frame at interior side, and exterior side to lap over precast concrete panels.**

C. Exterior Frames at Metal Stud Framed Walls: Fabricated from metallic-coated steel sheet.

1. **Fabricate frames with mitered and welded face corners with seamless face joints.**

2. **Frames for Level 3 Exterior Steel Doors: 0.067-inch thick (14 gauge) galvanized, metallic-coated steel sheet.**

3. **At Exterior metal stud framed walls with exterior veneer masonry or other exterior finish, provide frame sized to allow the scheduled stud, exterior sheathing, and interior wall finish(es) to be set inside the frame, and extend to cover the void between the CMU and the exterior finish.**

D. Interior Frames at Metal Stud Framed Walls: Fabricated from metallic-coated steel sheet.

1. **Fabricate frames with mitered and welded face corners with seamless face joints.**

2. **Frames for Interior Steel Doors or Wood Doors: 0.053-inch thick (16 gauge), galvanized, metallic-coated steel sheet.**

3. **Provide frames with overall dimension and throat dimension sized to accommodate the scheduled stud, sheathing, and interior wall finish(es) to be set inside the frame.**

E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

F. Jamb Anchors: Masonry, stud-wall, compression, or post-installed expansion type, as required by the application; not less than 0.042 inch thick.

G. Floor Anchors: Formed from same material as frames, but in no case less than 0.042 inch thick.

2.5 STOPS AND MOLDINGS

A. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.6 HOLLOW METAL DOOR AND WINDOW GLAZING

A. Provide manufacturer's heavy-duty, factory-assembled, galvanized steel view lite kits in the sizes indicated.

B. Glazing, where indicated, shall be 1/4" clear safety glass, wire-reinforced safety glass, rated glazing, or 9/16" impact-rated safety glazing, as indicated.

C. Provide lite kits sized to match the door thickness and glazing thickness, as scheduled and/or specified.

2.7 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify on the shop drawings any work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

C. Standard Steel 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. **Welded Frames: Weld flush face joints continuously; grind, fill, dress, and prime as required to make joints smooth, flush, and invisible.**
2. **Face frame joints that are not smooth, flat, and seamless shall be filled and patched in the field with automotive body filler, sanded smooth, and re-painted.**
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
5. Jamb Anchors: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide fixed stops and moldings welded on secure side of door or frame.
2. Provide loose stops and moldings on inside of doors and frames.

2.8 FINISHES

A. Steel Finish for Exterior Doors and Frames: Galvanized and/or factory primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

B. Steel Finish for Interior Doors and Frames located between Conditioned and Un-conditioned spaces, at Restrooms, Janitor Rooms, Kitchen Areas, and any other wet areas: Galvanized and factory primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

C. Steel Finish for Interior Doors and Frames: Galvanized and factory primed for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Remove welded-in shipping spreaders installed at factory.

B. Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

C. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

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.

2. Install frames using standard jamb anchor types and spacing, as recommended by the manufacturer, appropriate for anchoring frames to the adjacent wall materials.

3. Seal perimeter of each door frame with a polyurethane elastomeric sealant, prior to painting.

4. Coordinate installation of frames with framing, vapor barrier systems, masonry, cladding, wall flashing, and other components, as indicated on the drawings.

D. Standard Steel Frames at Metal Building: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.

1. **Set frames accurately in position; plumbed, aligned, and braced securely until permanent weld is made.**

2. **Where hollow metal door frames are to be installed into metal building framed openings, frames shall be welded to framing with a minimum 1-1/2" long fillet weld at 16" o.c. at interior and exterior. Clean and prime welds, prior to painting or caulking.**

3. **Seal perimeter of each door frame with a polyurethane elastomeric sealant used for metal wall panels, prior to painting.**

4. **Coordinate installation of frames with framing, vapor barrier systems, masonry, cladding, wall flashing, and other components, as indicated on the drawings.**

E. Standard Steel Doors: Fit hollow-metal doors accurately in frames. Shim as necessary.

F. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.

G. 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 standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

H. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

PART 4 - CLOSEOUT

4.1 CLOSEOUT DOCUMENTATION

A. Provide Closeout Documentation as

1. Provide copies of REVISED Door and Frame Schedules incorporating all field changes, change orders, added openings, etc.

2. Provide copies of the Manufacturer's Warranty information for all Door Hardware items incorporated into the project.

END OF SECTION 081110

SECTION 082110 - FLUSH WOOD DOORS, FACTORY PRE-FINISHED

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes wood-veneer faced, solid-core wood doors, with factory-applied transparent finish.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. Samples: Provide manufacturers full range of finishes for selection by architect.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.
2. Indicate dimensions and locations of cutouts.
3. Indicate fire-protection ratings for fire-rated doors.

1.3 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

B. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. Algoma Hardwoods, Inc.
2. Ampco Products, Inc.
3. Graham; an Assa Abloy Group company.
4. Chappell Door Co.
5. Mohawk flush Doors, Inc.
6. VT Industries, Inc.
7. Weyerhauser Company
8. Oshkosh Door Comapany
9. Approved Equal.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.

C. Interior, Veneer-Faced Doors

1. Particle Board Core, complying with the following requirements:
   a. Particle Board: ANSI A208.1

2. Structural-Composite-Lumber-Core Doors:
   a. Structural Composite Lumber: WDMA I.S.10.
   b. Construction: Five-ply or Seven-ply construction with stiles and rails bonded to core, then entire unit abrasive planed, prior to application of face veneers.

3. Solid Mineral Core Doors:
   a. Fire Rated Mineral Core
   b. Construction: Stiles and rails securely bonded to mineral core, faces and cross bands hot-pressed to core with Type I glue.

c. 45-minute, 60-minute, or 90-minute Rating, as scheduled, in accordance with ASTM E-152.
d. Positive / Negative pressure rating.
e. Permanently affix label of and approved 3rd Party Testing Agency: Underwriters Laboratories (UL), Warnock Hersey, or Intertek Testing Services

4. Provide doors with either glued-block or structural composite lumber cores at doors with exit devices.

D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.

E. Doors to receive Transparent (Stained & Sealed) Finish:

1. **Grade: Premium, with Grade AA faces.**
2. **Species and Cut: White Oak, Plain Sliced.**
3. **Match between Veneer Leaves: Book match.**
4. **Assembly of Veneer Leaves on Door Faces: Center Balance Match**
5. **Pair and Set Matching: Provide grain match for doors hung in the same opening, or separated only by mullions.**
6. **Room Match: Match door faces within each separate room or area of building. Corridor door faces need not match where separated by 20 feet, or more.**
7. **Transom Match: Continuous matching grain from door panel(s) below, and from transom panel to panel, where divided by mullion.**
8. **Stiles: Same species as face veneer.**
9. **Finish: Custom finish to match existing stained wood doors in the existing facility.**

NOTE SAMPLE OF EXISTING DOOR FINISH TO BE PROVIDED TO DOOR SUPPLIER / MANUFACTURER BY CONTRACTOR FROM EXISTING DOORS TO BE REMOVED. THE MANUFACTURER SHALL MATCH PROVIDED FINISH, AND SUBMIT SAMPLES INDICATING MATCHED FINISH FOR REVIEW AND APPROVAL.

2.3 LOUVERS AND LIGHT FRAMES

~~A. Metal Frames for Light Openings in Non-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for paint finish. Provide kits as required for sizes indicated in drawings and thicknesses indicated in specifications. Lite kits for non-rated doors shall match those for Fire-Rated Doors.~~

B. Wood Frames for Light Openings in Non-Rated Doors: Manufacturer's standard wood trimmed frame, bevelled trim of same wood species specified for door, suitable for factory stained finish, to match door. Provide kits as required for sizes indicated in drawings and thicknesses indicated in specifications.

C. **Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet, or as required by UL Listing; factory primed for field paint finish; and approved for use in doors of fire-protection rating indicated. Provide kits as required for sizes indicated in drawings and thicknesses indicated in specifications.**

D. Metal Louvers:

1. Provide Louvers of Type(s) and Size(s) indicated and/or scheduled on the drawings.
2. Finish: factory finished, in manufacturer’s standard color range.
3. Where extruded aluminum louvers are specified, provide choices to include, at a minimum, the following color options: clear, light bronze, medium bronze or dark bronze, Class II anodic finish.
4. 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. Air Louvers, inc.
    b. Anemostat Door Products
    c. Gulfport Industries, Inc.
    d. Leslie-Locke, Inc.
    e. Approved Equal

2.4 GLAZING

A. Refer to Specification Section 088000 “Glass and Glazing” and Door Schedule provided in Drawings for glazing types. Provide glazing types as noted therein.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Provide blocking at locations for surface applied hardware as scheduled.

D. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile, if indicated.

2. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY PRE-FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish and seal both faces, all four edges, edges of cutouts, and mortises.

2. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Transparent Finish:

1. Grade: Premium.
2. **Finish: Custom finish to match existing stained wood doors in the existing facility.**

NOTE SAMPLE OF EXISTING DOOR FINISH TO BE PROVIDED TO DOOR SUPPLIER / MANUFACTURER BY CONTRACTOR FROM EXISTING DOORS TO BE REMOVED. THE MANUFACTURER SHALL MATCH PROVIDED FINISH, AND SUBMIT SAMPLES INDICATING MATCHED FINISH FOR REVIEW AND APPROVAL.

2.7 WARRANTY

A. Special Warranty: Manufacturer's standard for, signed by the manufacturer, installer, and contractor, in which the manufacturer agrees to repair or replace doors that are defective in materials or workmanship.

1. Warranty shall include replacement due to delamination of face veneers.

2. Warranty shall include replacement due to warping (bow, cup, or twist) more than ¼" in a 42" x 84" section, or show telegraphing of core construction in face veneers, exceeding 0.01 inch in a 3 inch span.

3. Warranty shall include installation and finishing of that may be required due to repair or replacement of defective doors.

4. Warranty shall include time and transportation of the manufacturer's representative to visit the project site for investigative purposes.

5. Warranty shall remain in effect during the following period of time, beginning on the date of Substantial Completion:

a. Solid-Core Wood Doors: Life of Installation

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; 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-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 082110

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for Exterior and Interior Openings.

2. Interchangeable Core and Keying System

1.2 SUBMITTALS

A. Door Hardware Schedule: Organized into door hardware sets indicating type, style, function, size, label, hand, manufacturer, fasteners, location, and finish of each door hardware item. Include description of each electrified door hardware function, including sequence of operation (if applicable).

B. Keying Schedule: Detail Owner's final keying requirements and/or instructions for locks.

1.3 QUALITY ASSURANCE

A. **Supplier Qualifications: The Hardware Supplier shall be a Factory Authorized supplier for the Door Hardware provided, in current good standing with the manufacturer(s) supplied.**

B. Keying Conference: The Door Hardware Supplier shall conduct up to (3) conferences at the Project site, with the Owner and Architect, to ascertain and assimilate the Owner's keying requirements. Incorporate keying conference decisions into final keying schedule.

C. Cores and Keys will be purchased by the supplier, and shipped to the Owner. Cores and keys are to be factory-keyed, however, the Door Hardware Supplier must have the ability to perform limited keying in-house.

D. If the Door Hardware for this project includes any electronic access controlled hardware which may affect or impede the egress from the building, as required by building and/or Life Safety codes, such hardware and associated electronic equipment shall be installed by a Security Contractor licensed by the State of Louisiana to perform such work.

E. Standards: Comply with BHMA A156 series standards, Grade 1.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within warranty period.

1. Warranty Period for Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Product named for each door hardware item indicated in Door Hardware Sets establishes the basis of design. Provide either the named product or a comparable product by one of the manufacturers specified for each type of hardware item. Submit proposed substitutions to the Architect prior to the Bid, for review and approval.

B. Provide each type of hardware from one manufacturer only.

C. Approved manufacturers for

1. **Interchangeable Cores & Keying: CORBIN RUSSWIN Pyramid Security, 7-Pin**
To Match Existing SOWELA's Existing Grand Master Keying System
***** NO SUBSTITUTIONS ALLOWED *****

2.	Mortise Locksets:	Corbin Russwin – Series ML2000 Best - Series 45H
3.	Cylindrical Locksets:	Corbin Russwin – Series CL3300 / CLX3300 (Indicator) Best – Series 9K / 9K (Indicator)
4.	Deadbolt	Corbin Russwin – Series DL3000 Best – Series 8T
3.	Exit Devices:	Corbin Russwin – Series ED5000 / ED5000S Precision – Series 2000
4.	Key Removeable Mullion:	Corbin Russwin - Series 900BKM Precision – Series HC822
5.	Closers:	Corbin Russwin – Series DC6000 Stanley – Series QDC100 (full cover)
6.	Continuous Hinges:	Pemko, McKinney, Stanley
8.	Butt Hinges:	McKinney, PBB, Ives, Stanley
7.	Misc. Items & Flat Goods:	Rockwood, Ives
8.	Weatherization Products:	Pemko, Ives

2.2 SUPPLIER REQUIREMENTS

The Hardware Supplier shall be an established Door and Hardware supply company, located within 150 miles of the project site. The Hardware Supplier shall have an Architectural Door Consultant (AHC) on staff, and be factory authorized to sell, modify, and repair the products specified, and have in-house keying capabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

B. Steel Door and Frame Preparation: Comply with DHI A115 series. Drill and tap doors and frames for surface-applied hardware according to SDI 107.

C. Mounting Heights: Comply with the following requirements, unless otherwise indicated:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

3.2 **KEYING INSTRUCTIONS**

Factory keying of cylinders is required. All new locks provided shall be keyed into the existing master key system. The Owner will provide copies of the existing master and/or grandmaster keys for the hardware supplier's use, if applicable.

This project will be keyed into the Existing Calcasieu Parish School Board facilities CORBIN RUSSWIN Factory-Controlled, Grand-Master Keying System.

Provide zero (0) factory-cut Great Grand Master (System-Wide) Keys.
Provide eight (8) factory-cut Exterior Grand Master Keys.
Provide eight (8) factory-cut Interior Grand Master Keys.
Provide four (15) factory-cut Interior Master Keys, as is applicable.
Provide four (4) factory-cut Change Keys for each door opening.
Provide two (2) Core keys for installation & removal of cores.

Factory-keyed cores shall be provided as part of the Project.

Cores shall be shipped by CORBIN RUSSWIN, directly to the Owner.

Installation of Permanent Cores shall be the responsibility of the Contractor.

Permanent Cores shall be installed after Substantial Completion has been issued, and immediately prior to Occupancy by the Owner.

Do not issue keys to permanent cores to any Contractor employee or Subcontractor, with the exception of the Contractor's Project Superintendent, who shall have sole responsibility for granting access to the facility, and unlocking / locking the facility once the permanent cores have been installed.

The Contractor shall transmit all keys, with keying list(s) to the Owner, via signed Transmittal.

Factory Keying is required. Keying by the Hardware Supplier will not be accepted.

CONTRACTORS, DOOR HARDWARE SUPPLIERS, AND DOOR LOCK CORES AND KEYING SUPPLIERS SHALL NOTE THE FOLLOWING:

THE SPECIFICATION OF BEST ACCESS SYSTEMS FOR CORES AND KEYING IS REQURIED TO FACILITATE THE EXTENSION OF THE OWNER'S EXISTING FACILITY-WIDE SYSTEM. THIS REQUIREMENT IS NOT INTENDED TO REQUIRE THE USE OF LOCKS AND OTHER DOOR HARDWARE BY THE SAME MANUFACTURER, AND THIS REQUIREMENT SHALL NOT, IN ANY WAY, PRECLUDE OR RESTRICT COMPETITIVE BIDDING FOR THE BALANCE OF THE DOOR HARDWARE, OR THE SAME OR A DIFFERENT MANUFACTURER.

AS SUCH, AND TO ENSURE COMPETITIVE BIDDING AS REQUIRED BY THE STATE OF LOUISINA PUBLIC BID LAW, ALL DOOR HARDWARE SUPPLIERS AND DOOR HARWARE MANUFACTURERS SHALL PROVIDE SEPARATE PRICES FOR THE DOOR LOCK CORES AND KEYING (SINGLE-SOURCE) SEPARATE FROM THE BALANCE OF THE DOOR HARDWARE PACKAGE.

FAILURE TO SEPARATE PRICING AS SPECIFIED ABOVE CONSTITUTES A VIOLATION OF LOUISIANA PUBLIC BID LAW, AND RESULT IN DISQUALIFICATION OF THE SUPPLIER'S BID, AS WELL AS SUBJECT THE SUPPLIER TO LEGAL ACTION BY THE OWNER AND/OR THE STATE OF LOUISIANA.

3.3 KEY CABINET

A. Provide (1) Lockable Key Cabinet, sized to accommodate the keys included in this project + 100% expansion.

Install key cabinet in existing SOWELA Facilities Office, as instructed by the Owner.

3.4 SITE VISITS / KEYING CONFERENCES:

The hardware supplier shall allow in his price for a minimum of three (3) site visits for keying conference(s) and verification of existing hardware, keying, etc., and (1) inspection of hardware installation and function prior to final inspection and substantial completion.

PART 4 - CLOSEOUT

4.1 CLOSEOUT

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

B. Steel Door and Frame Preparation: Comply with DHI A115 series. Drill and tap doors and frames for surface-applied hardware according to SDI 107.

4.2 CLOSEOUT DOCUMENTATION

1. Provide copies of REVISED Door Hardware Schedules incorporating all field changes, change orders, added openings, etc. Include cut sheets for all Door Hardware items incorporated into the Project.

2. Provide copies of the Manufacturer's Operation and Maintenance documentation for all Door Hardware items incorporated into the Project.

3. Provide copies of the Manufacturer's Warranty information for all Door Hardware items incorporated into the project.

PART 5 - DOOR HARDWARE SETS

5.0 Refer to the following page(s) for Door Hardware Schedule.

DOOR HARDWARE SCHEDULE

Date of Issue: March 13, 2026

Note: **The following Hardware Sets represent the design intent and direction of the Owner and Architect. They are provided as a guideline only, and may not be complete, or all-inclusive. Discrepancies, conflicting hardware, and missing items should be brought to the attention of the Architect prior to bidding, for clarifications to be issued by, and included in an Addendum. Otherwise, corrections shall made by the Door Hardware Supplier, as required for proper application and full functionality, at no additional cost to the Owner, prior to Acceptance by the Owner.**

Note: **If any opening indicated on the Drawings is not included in this Hardware Schedule, the Hardware Supplier shall, at no additional cost to the Owner, provide Finish Hardware as scheduled for the most similar door type listed herein, or as can be reasonably anticipated to be required for the particular application.**

Cylinders: **The Door Hardware Supplier shall verify and provide cylinders as required for the application and/or installation type, including for those openings provided by others, prior to order.**

Cores: **Provide removable IC-Type 7-Pin, high security cores for all doors where locking functions are required.**

Provide temporary Construction Cores for all exterior doors and interior doors required to be secured during construction operations.

All permanent cores shall be shipped directly to the Owner, with tracking, and with delivery signature required. The Owner will provide permanent cores to the Contractor for installation, immediately prior to Substantial Completion, Acceptance by the Owner, and/or Occupancy.

Keying: **This facility shall be keyed into the Owner's existing CORBIN RUSSWIN, Factory-Controlled Keying System.**

The new Keying will be incorporated into the Owner's Existing Exterior Grand Master/Master Key System and Existing Interior Grand Master/Master Key System.

The CORBIN RUSSWIN Representative will coordinate locking requirements for all work included within the scope of this project with the Architect, Owner, & Contractor.

The CORBIN RUSSWIN Representative will coordinate any locking requirements beyond the scope of this project directly with the Owner.

The Door Hardware Supplier shall verify the existing core manufacturer and key-way profile(s) with the Owner.

A meeting will be held at a later date with the Owner, Architect, Contractor, and Door Lock Core & Keying Supplier, to develop a keying schedule.

PROCESS TECHNOLOGY BUILDING EXPANSION
for SOWELA Technical Community College

Door Hardware Schedule

Issued with Bidding Documents: March 13, 2026

Hardware Set: 1.0
BASE BID
Existing Exterior Main Entrance Door
Existing Aluminum Frame x Existing Aluminum Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
Non-Rated

Door(s) Mark: 100A

1	Each	Cylinder	*Provide as required for Existing Exit Device. Contractor Field Verify*	626	COR
1	Each	Cylinder Ring	*Provide as required for Existing Exit Device & New Cyl. Contractor Field Verify*	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
2	Each	Offset Pull	RM204 x 36" x Type 12 HD Mtg. (Mtd. 30" to 66" A.F.F.)	630	ROC
8	Each	Alum. Storefront Door Hole Filler Plugs (for holes where previous pulls were removed)		Aluminum Gray	

**** Note: Remove and Replace Existing Door Pulls, Cylinders, and Cores. All Other Door Hardware To Remain ****

Hardware Set: 2.0
BASE BID
Existing Exterior Corridor Door
Existing Hollow Metal Frame x Existing Hollow Metal Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
Non-Rated

Door(s) Mark: 100D

1	Each	Cylinder	*Provide as required for Existing Exit Device. Contractor Field Verify*	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Cylinders and Cores. All Other Door Hardware To Remain ****

Hardware Set: 3.0
BASE BID
Existing PTECH Lab Exterior Door
Existing Hollow Metal Frame x Existing Hollow Metal Door
8'-0"W. x 8'-0"H. x 1-3/4" Thk. (Pair)
Non-Rated

Door(s) Mark: 101G

2	Each	Cylinder	*Provide as required for Existing Exit Device.*	626	COR
2	Each	Temporary Core	CTP	RED	COR
2	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Cylinders and Cores. All Other Door Hardware To Remain ****

Hardware Set: 4.0
BASE BID
New Exterior Corridor Entrance Door
New Galvanized Hollow Metal Frame x New Galvanized Hollow Metal Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
Non-Rated

Door(s) Mark: 100H

2	Each	Continuous Hinge	CFM x 7'-0" x SLF x HD1 x 1-3/4" Door	Clr. Alum.	PEM
2	Each	Offset Pull	RM201 x 12" x Type 12 HD Mtg.	630	ROC
1	Each	Keyed Removable Mullion	FE707A x BKM x 7'-0 (*Field paint, match Door&Frame*)	600	COR
1	Each	Door Mullion Stabilizer Kit	653F11-1 *(Field paint, match Door & Frame)*	628	COR
1	Each	Rim Exit Device (NL)	ED5200S x K157 x M107 x M52 x M54 x M58 x CTP	630	COR
1	Each	Rim Exit Device (EO)	ED5200S x EO x M107 x M52 x M54 x M58 x CTP	630	COR
4	Each	Cylinder	*Provide as required for application.*	626	COR
4	Each	Temporary Core	CTP	RED	COR
4	Each	Permanent Core	8027 x GMK	626	COR
2	Each	Closer w/ Stop & Hold Arm	DC6210 x A12 x M54	689	COR
2	Each	Kick Plate (Push Side)	K1050 x 8"H. x 1"LDW x 4BE x CSK	630	ROC
1	Each	Threshold, ADA, Std. Back	2005-AT x 72"	Clr. Alum.	PEM
2	Each	Door Bottom Sweep	223-ANB x 36" x Door Thickness	Clr. Alum.	PEM
1	Set	Perimeter Seal	290-APK x Opening Size	Clr. Alum.	PEM
1	Set	Meeting Stile Seal	305-CN x 84"	Clr. Alum.	PEM

Hardware Set: 5.0

BASE BID

New Exterior Entrance Door With Access Control

New Galvanized Hollow Metal Frame x New Galvanized Hollow Metal Door

3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)

Non-Rated

Door(s) Mark: 110E

1	Each	Continuous Hinge	CFM x 7'-0" x SLF x HD1 x 1-3/4" Door	Clr. Alum.	PEM
1	Each	Offset Pull	RM201 x 12" x Type 12 HD Mtg.	630	ROC
1	Each	Rim Exit Device (NL)	ED5200S x K157 x M107 x M52 x M54 x M58 x CTP	630	COR
1	Each	Surface Electric Strike, WS Rated	9700 x Fail Secure	630	HES
1	Each	Rectifier	2001M	N/A	HES
1	Each	Elect. Cable - E.S. to P.S.	QC-C1500P	N/A	MCK
1	Each	Power Supply / Control Mod.	782	N/A	COR
2	Each	Cylinder	*Provide as required for application.*	626	COR
2	Each	Temporary Core	CTP	RED	COR
2	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Closer w/ Stop & Hold Arm	DC6210 x A12 x M54	689	COR
1	Each	Kick Plate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Threshold, ADA, Std. Back	2005-AT x 72"	Clr. Alum.	PEM
1	Each	Door Bottom Sweep	223-ANB x 36" x Door Thickness	Clr. Alum.	PEM
1	Set	Perimeter Seal	290-APK x Opening Size	Clr. Alum.	PEM
1	Each	Keypad / Card Reader	** Provided & Installed by Access Control Subcontractor **		

Hardware Set: 6.0

BASE BID

New Exterior PTECH Lab Door

New Galvanized Hollow Metal Frame x New Galvanized Hollow Metal Door

8'-0"W. x 8'-0"H. x 1-3/4" Thk. (Pair)

Non-Rated

Door(s) Mark: 110F

2	Each	Continuous Hinge	CFM x 8'-0" x SLF x HD1 x 1-3/4" Door	Clr. Alum.	PEM
1	Each	Keyed Removable Mullion	FE708A x BKM x 8'-0 (*Field paint, match Door&Frame*)	600	COR
1	Each	Door Mullion Stabilizer Kit	653F11-1 *(Field paint, match Door & Frame)*	628	COR
1	Each	Rim Exit Device (EO)	ED5200S x EO x W048 M107 x M52 x M54 x M58 x CTP	630	COR
1	Each	Cylinder	*Provide as required for application.*	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
2	Each	Closer w/ Stop & Hold Arm	DC6210 x A12 x M54	689	COR
2	Each	Kick Plate (Push Side)	K1050 x 8"H. x 1"LDW x 4BE x CSK	630	ROC
1	Each	Threshold, ADA, Std. Back	2005-AT x 96"	Clr. Alum.	PEM
2	Each	Door Bottom Sweep	223-ANB x 48" x Door Thickness	Clr. Alum.	PEM
1	Set	Perimeter Seal	290-APK x Opening Size	Clr. Alum.	PEM
1	Set	Meeting Stile Seal	305-CN x 96"	Clr. Alum.	PEM
1	Each	Rain Drip	346C x 100"	Clr. Alum.	PEM

Hardware Set: 7.0
BASE BID
New Classroom / Lab Door (In-Swing)
New Hollow Metal Frame x New Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
45-Minute Rated

Door(s) Mark: 109A, 111

3	Each	Hinges, HD, BB	T4A 3786 x 4.5 x 4.5	652	MCK
1	Each	Office / Entry Lock (w/ Vis. Ind.)	CLX3351 x NZD@EXT/NVSL@INT x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Closer (No Holder)	DC6210 x A3 x M54	689	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

Hardware Set: 8.0
BASE BID
New Classroom / Lab Door (In-Swing)
New Hollow Metal Frame x New Solid Core Wood Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
45-Minute Rated

Door(s) Mark: 110A

6	Each	Hinges, HD, BB	T4A 3786 x 4.5 x 4.5	652	MCK
1	Each	Office / Entry Lock (w/ Vis. Ind.)	CLX3351 x NZD@EXT/NVSL@INT x CTP	626	COR
1	Each	Dummy Lever Set	CL3370 x NZD x NK	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Set	Combination Flush Bolt (Top) + Auto Flush Bolt (Bottom) Set	2845	626	ROC
1	Each	Dust Proof Strike	570	626	ROC
1	Each	Door Coordinator w/ Filler	NX2672 (w/ 20" Long Filler Section)	PC	ROC
			*** Note: Field Paint to match Door Frame **		
2	Each	Closer Arm Offset Bracket	2601##	PC	COR
			*** Note: Field Paint to match Door Frame **		
2	Each	Closer w/ Stop (No Holder)	DC6210 x A4 x M54	689	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 1"LDW x 4BE x CSK	630	ROC
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

Hardware Set: 9.0
BASE BID
New Classroom / Lab Common Door
New Hollow Metal Frame x New Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
Non-Rated

Door(s) Mark: 109B

3	Each	Hinges, HD, BB, NRP	T4A 3786 x 4.5 x 4.5 x NRP	652	MCK
1	Each	Institutional Lock (w/Vis. Ind.)	CLx3352 x NVSL@EXT/NVSL@INT x CTP	626	COR
2	Each	Temporary Core	CTP	RED	COR
2	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Closer w/ Holder	DC6210 x A2 x M54	689	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

Hardware Set: 10.0
BASE BID
New Work Room Door (Out-Swing)
New Hollow Metal Frame x New Solid Core Wood Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
Non-Rated

Door(s) Mark: 110B

6	Each	Hinges, HD, BB, NRP	T4A 3786 x 4.5 x 4.5 x NRP	652	MCK
1	Each	Office / Entry Lock	CL3351 x NZD x CTP	626	COR
1	Each	Dummy Lever Set	CL3370 x NZD x NK	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Pair	Automatic Flush Bolts	2962	626	ROC
1	Each	Dust Proof Strike	570	626	ROC
2	Each	Kickplate (Push Side)	K1050 x 8"H. x 1"LDW x 4BE x CSK	630	ROC
2	Each	Mutes	608	Gray	ROC

Hardware Set: 11.0
BASE BID
New Mechanical Platform Access Door
New Hollow Metal Frame x New Solid Core Wood Door
4'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
Non-Rated
Door(s) Mark: 110C

3	Each	Hinges, HD, BB, NRP	T4A 3786 x 4.5 x 4.5 x NRP	652	MCK
1	Each	Storeroom Lock	CL3357 x NZD x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Closer w/ Stop & Holder	DC6210 x A2 x M54	689	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Set	Perimeter Seal	290-APK x Opening Size	Clr. Alum.	PEM
1	Each	Auto Door Bottom, Surface	STC4131-C x 36"	Clr. Alum.	PEM

Hardware Set: 12.0
BASE BID
Existing Faculty Corridor Door (Out-Swing)
Existing Classroom Door (In-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
45-Minute Rated
Door(s) Mark: 100E, 100F, 102, 103, 104, 105, 106, 107, 108, 117

1	Each	Office / Entry Lock (w/ Vis. Ind.)	CLX3351 x NZD@EXT/NVSL@INT x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Lockset and Core(s). All Other Door Hardware To Remain ****

Hardware Set: 13.0
BASE BID
Existing Faculty Office / Exist. Control Sim. Room / Exist W.H. Room Doors (In-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
Non-Rated
Door(s) Mark: 101B, 101C, 119, 120, 121, 122, 123, 124/126, 125, 127, 128, 129

1	Each	Permanent Core (Conventional)	2027-033 x GMK	626	COR

**** Note: Remove and Replace Existing Core(s). All Other Door Hardware To Remain ****

Hardware Set: 14.0
BASE BID
Existing Janitor / Existing Data Room / Exist Electrical Room Doors (Out-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
45-Minute Rated / Non-Rated
Door(s) Mark: 101D, 113, 114

1	Each	Storeroom Lock	CL3357 x NZD x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Lockset and Core(s). All Other Door Hardware To Remain ****

Hardware Set: 15.0
BASE BID
Existing Electrical Room / Existing Mechanical Room Doors (Out-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
45-Minute Rated / Non-Rated
Door(s) Mark: 101E, 101F, 112

1	Each	Storeroom Lock	CL3357 x NZD x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Lockset and Core(s). All Other Door Hardware To Remain ****

Hardware Set: 16.0
BASE BID
Existing Corridor Doors (Out-Swing)
Existing Classroom / Lab Doors (Out-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
6'-0"W. x 7'-0"H. x 1-3/4" Thk. (Pair)
45-Minute Rated
Door(s) Mark: 100B, 101A

2	Each	Cylinder	*Provide as required for Existing Exit Device. Contractor Field Verify*	626	COR
2	Each	Temporary Core	CTP	RED	COR
2	Each	Permanent Core	8027 x GMK	626	COR

**** Note: Remove and Replace Existing Cylinders and Cores. All Other Door Hardware To Remain ****

Hardware Set: 17.0
BASE BID
Existing Public Restroom Doors
Existing Hollow Metal Frame x Existing Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
45-Minute Rated / Non-Rated
Door(s) Mark: 115, 116

**** Note: No Hardware Modifications At This Door ****

Hardware Set: 18.0
ALTERNATE NO.2
Existing Faculty Corridor Door (Out-Swing)
Existing Hollow Metal Frame x Existing Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
45-Minute Rated

Door(s) Mark: 100E, 100F
****NOTE: REPLACES DOOR HARDWARE SCHEDULED AT THESE DOORS IN BASE BID****

3	Each	Hinges, HD, BB	T4A 3786 x 4.5 x 4.5	652	MCK
1	Each	Office / Entry Lock (w/ Vis. Ind.)	CLX3351 x NZD@EXT/NVSL@INT x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Each	Auto Door Bottom, Mortise	411-ARL x 36"	Clr. Alum.	PEM
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

Hardware Set: 19.0
ALTERNATE NO.2
New Faculty Office / Conference Room Door
New Hollow Metal Frame x New Solid Core Wood Door
3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)
Non-Rated

Door(s) Mark: 117, 120, 122, 124, 126
****NOTE: REPLACES DOOR HARDWARE SCHEDULED AT THESE DOORS IN BASE BID****

3	Each	Hinges, HD, BB	T4A 3786 x 4.5 x 4.5	652	MCK
1	Each	Office / Entry Lock	CL3351 x NZD x CTP	626	COR
1	Each	Temporary Core	CTP	RED	COR
1	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Each	Auto Door Bottom, Mortise	411-ARL x 36"	Clr. Alum.	PEM
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

Hardware Set: 20.0

ALTERNATE NO.2

Work Room / Break Room Door

New Hollow Metal Frame x New Solid Core Wood Door

3'-0"W. x 7'-0"H. x 1-3/4" Thk. (Single)

Non-Rated

Door(s) Mark: 118

3	Each	Hinges, HD, BB	T4A 3786 x 4.5 x 4.5	652	MCK
1	Each	Passage Lock	CL3310 x NZD x CTP	626	COR
0	Each	Temporary Core	CTP	RED	COR
0	Each	Permanent Core	8027 x GMK	626	COR
1	Each	Closer w/ Holder	DC6210 x A2 x M54	689	COR
1	Each	Kickplate (Push Side)	K1050 x 8"H. x 2"LDW x 4BE x CSK	630	ROC
1	Each	Floor Stop	441H	626	ROC
1	Each	Auto Door Bottom, Mortise	411-ARL x 36"	Clr. Alum.	PEM
1	Set	Perimeter Gasketing	S88-GR x Opening Size	Gray	PEM

SECTION 088000 – GLASS AND GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This 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. Glazing for Exterior Door Assemblies.
2. Glazing for Exterior Window Assemblies.
3. Glazing for Interior Door Assemblies.
4. Glazing for Interior Window Assemblies.
5. Where Curtain Wall Systems are provided, refer to the Specification for additional requirements.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Types and Thicknesses:

a. **Exterior Doors – 9/16” thick Impact-Rated Glazing.**
b. **Exterior Windows – 1-5/16” thick, Insulated Impact Rated Glazing Units at impact rated window units, with 9/16” thick, Green Tinted, Impact-Rated glazing, air space, Low-E coating, and 1/4" clear tempered glazing, and black spacers.**
c. **Interior Rated Windows – 9/16” thick, Clear, Fire Rated Security Glazing, U.L. listed, with clear inner-layer or wire mesh.**
d. **Interior Non-Rated Windows – 9/16” thick, Clear, Impact-Rated security glazing, with clear inner-layer.**
e. **Interior Rated Door View Lites – 9/16” thick, Clear, Fire Rated Security Glazing, U.L. listed, with clear inner-layer.**
f. **Interior Non-Rated Door View Lites – 9/16” thick, Green Tinted, Impact-Rated Security glazing, with clear inner-layer.**

2. Glazing Schedule:

    a. **Refer to the Floor Plan, Exterior Elevations, Interior Elevations, Window Schedule, and Door Schedule in the Drawings for locations and extent of Glazing in this project, as well as requirements for tinting, and coatings required.**

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's product data for or each glazing product and material indicated.

B. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.

C. Product Samples: Provide manufacturer's sample(s) for or each glazing product, material, and color indicated. Samples shall be representative of the actual product, material, and color to be installed.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Source Limitations: Obtain glazing and glazing accessories through one source from a single manufacturer and one single installer for each product and installation method indicated.

C. Glazing for Fire-Rated Door Assemblies: Fire-rated glass material with surface-applied film listed for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements of 45 minutes with required hose stream test.

D. Glazing for Impact-Rated Door and Window Assemblies: Impact-rated glazing with laminated inner-layer, as required to meet the small-missile and large-missile impact requirements for the wind speed and Risk Category as specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:

1. Vitro America, LLC
2. PPG Glass
3. Oldcastle Glass
4. AGC Flat Glass North America

2.2 GLASS PRODUCTS

A. Glazing for Fire-Rated Interior Door Assemblies: Fire-rated glass material with surface-applied film listed for use in impact safety-rated locations such as doors, transoms and borrowed lites with fire rating requirements of 45 minutes with required hose stream test.

1. 45 minute rated, clear category II tempered safety glass: 1/2" thick
    a. Reference drawings for sizes and locations.

2. 90 minute rated, clear category II tempered safety glass: thickness as required by U.L. Listing.
    a. Reference drawings for sizes and locations.

B. Non-insulated Glazing for Impact Rated Door and Window Assemblies: Laminated, non-insulated glass material with laminated inner-layer, as required to meet the missle impact requirements for the wind speed and Risk Category as specified.

1. Laminated Non-Insulated Impact Glazing: **9/16" thick**
    a. Reference drawings for sizes and locations.

C. Insulated Glazing for Impact Rated Door and Window Assemblies: Laminated, Insulated glass unit with laminated inner-layer, as required to meet the missle impact requirements for the wind speed and Risk Category as specified.

1. Laminated Insulated Impact Glazing: **1-5/16" thick**

    a. Reference drawings for sizes and locations.

2.3 GLAZING GASKETS

A. Gaskets: Molded or extruded gaskets and of profile and hardness required to maintain watertight seal:

2.4 GLAZING SEALANTS

B. Sealants: Select 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. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

2.5 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, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 088100 - PRE-FINISHED ALUMINUM CURTAINWALLS, STOREFRONTS, & GLAZING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior Glass and Glazing

B. Interior Glass and Glazing.

C. Aluminum Framing systems, including Storefronts and Curtainwalls.

D. Aluminum and Glass Entrances and Doors.

E. Plate Glass Mirrors

F. Glazing Sealants

G. Glazing of hollow metal doors

H. Glazing of wood doors.

I. Glazing of plastic laminate faced wood doors.

J. Installation of Door Hardware (provided by others) at Aluminum Doors.

1.2 RELATED WORK

A. Section 081113 - Hollow Metal Doors and Frames

B. Section 081436 - Wood Doors

C. Section 081113 - Plastic Laminate Faced Wood Doors

D. Section 087100 - Finish Hardware

E. Section 079200 – Building Sealants – sealing adjacent construction materials

1.3 REFERENCES

A. American Architectural Manufacturers Association
1. AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site
2. AAMA/NWWDA 101/I.S.2, Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors2.
3. AAMA 502, Voluntary Specification for Field Testing of Windows and Sliding Glass Doors
4. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum
5. AAMA 2604, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

B. American National Standards Institute (ANSI)
1. Z97.1, Safety Performance Specification
2. Z97.1, Safety Glass Code

C. ASTM International (ASTM)
1. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
2. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
3. B210, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
4. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
5. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
6. C509, Standard Specification for Cellular Elastomeric Preformed Gasket and Sealing Material
7. C1036, Standard Specification for Flat Glass
8. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
9. E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
10. E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain
Walls, and Doors by Uniform Static Air Pressure Difference

11. E547, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential

D. American Welding Society (AWS)

E. Federal Specification (FS)

1. DD-G-001403 B
2. T-G-410, Sash putty
3. TT-C-494, Bituminous Paint
4. TT-S-00230, Sealing Compound: Synthetic Rubber Base and TT-S-00203C
5. TT-S-001657, Sealing Compound: Butyl Rubber Base
6. SS-C-153, Mastic Bulk Compound

F. Flat Glass Marketing Association

1. Glazing Sealing Systems
2. Glazing Manual

1.3 DELEGATED DESIGN SUBMITTAL

A. Design and Structural analysis data and calculations shall be signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.

B. Design and Structural analysis data and calculations shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.

C. Approval Drawings and 'For Construction' Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.

D. Design/Code Requirements: Curtainwall systems shall be designed in accordance with the requirements of the following Codes, Standards, and other criteria:

1. **IBC-2021**
2. **ASCE-7-16 wind uplift requirements for "Components & Cladding", based on the project's specific geographical location and zone**
3. **Risk Category: "III"**
4. **Exposure Category: "C"**
5. **145 MPH, 3-second gust wind speed**

E. Engineering Calculations: Engineering calculations defining cladding loads on all curtainwall areas based on specified building codes, allowable fastener loads, and attachment to the building structural system.

F. Certifications:

1. **Engineering Certification Letter, with Seal and Signature of the Louisiana licensed Professional Engineer responsible for the design and listing the applicable design criteria.**
2. **Letter of certification from manufacturer that installer is in compliance and meets the specified requirements.**
3. **Certified test results by a recognized testing laboratory or manufacturer's laboratory (witnessed by a professional engineer) in accordance with specified performance test methods for each assembly type provided.**
4. **Testing Reports: Showing that curtain wall systems and components have been tested in accordance with specified the performance testing requirements.**

1.4 SUBMITTALS

A. Shop Drawings: Complete shop drawings by manufacturer indicating elevations, sections, substrates, fasteners, finishes, hardware and installation details.

B. Manufacturer's specifications and other data needed to prove compliance with specified requirements, and manufacturer's installation instructions.

C. Engineer's calculations of performance requirements.

D. Product data: manufacturer's specifications and test reports from an AAMA-accredited laboratory.

E. Samples: Showing color(s):

1. Samples of framing finish and fastener types for Architect's & Owner's approval. Architect & Owner will select finishes and colors from those available from manufacturer.
2. In-place sample of sealant at frame perimeter for Architect's & Owner's approval. Architect & Owner will select colors from manufacturer's full available colors.
3. Samples of each type of glass (12 inches x 12 inches minimum)

F. Certification of Installation:

1. Provide written certification stating that materials provided meet the specified requirements.
2. Include the following specific information indicating their compliance with referenced standards.
   a. Thermal movement
   b. Structural properties
   c. Water penetration
   d. Air leakage
   e. Finishes on aluminum surfaces

1.5 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. In addition to complying with pertinent codes and regulations of governmental agencies having jurisdiction, comply with pertinent recommendations contained in the above referenced Flat Glass Marketing Association publications.

C. Furnish a valid AAMA "Notice of Product Certification" indicating that the windows for the project conform to AAMA/NWWDA 101/I.S.2-97.

1.6 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 13 – Project Coordination.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and protect windows and accessories in accordance with AAMA CW-10-97 until project completion

1.8 WARRANTY

A. Warrant the work specified herein for (2) years, against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship, except provide a five (5) warranty against silver spoilage of mirrors.

B. Defects shall include, but not be limited to, the following:

1. Faulty, improper or inadequate attachment or installation.
2. Chipped edges, broken, or scratched glass and mirrors.
3. Defective finish of molding
4. Distortion or waves

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers not listed whose product meet or exceed the Design Standards shall submit for Prior Approval, prior to bidding. Other manufacturers shall have a minimum of five (5) years experience manufacturing products meeting or exceeding the Design Standards and comply with Division 1 requirements regarding substitutions to be considered.

1. Aluminum Framing System, and Doors:

a. Kawneer Co., Inc., Jonesboro, GA; (770) 478-8841 (Basis of Design Standard)
b. Tubelite Storefronts & Entrances, Reed City, MI; (800) 866-2227
c. YKK AP America, Inc., Grand Prairie, TX; (972) 206-2554
d. United States Aluminum, Waxahachie, TX; (800) 627-6440
e. Vistawall Architectural Products (Oldcastle Glass), Terrell, TX; (972) 551-6100

2. Aluminum Window Manufacturers:
    a. Kawneer Co., Inc., Jonesboro, GA; (770) 478-8841 (Basis of Design Standard)
    b. Tubelite Storefronts & Entrances, Reed City, MI; (800) 866-2227
    c. YKK AP America, Inc., Grand Prairie, TX; (972) 206-2554
    d. United States Aluminum, Waxahachie, TX; (800) 627-6440
    e. Vistawall Architectural Products (Oldcastle Glass), Terrell, TX; (972) 551-6100
    f. Any of the above manufacturers accepted for Aluminum Storefronts who produce aluminum windows as specified.
3. Glass:
    a. AGC Flat Glass North America , Kingsport Tenn. (423) 229-7200
    b. Guardian Industries Corp., Corsicana, TX; (800) 527-2511
    c. Oldcastle Glass Houston, Houston, TX; (866) 653-2278
    d. Pilkington, Toledo, OH; (419) 247-4721
    e. PPG Industries, Inc., Pittsburgh, PA; (412) 434-2858 f.
    f. Viracon, Owatonna, MN; (800) 533-2080
4. Fire Rated Glass:
    a. Oldcastle Glass “Pyrogaurd” Houston, Houston, TX; (866) 653-2278
    b. Safti “Superlite C/SP”, San Francisco, CA (888) 653-3333
    c. Technical Glass Products “Firelite NT”, Kirkland, WA (800) 451-9857
    d. Vetrotech Saint-Gobain “Keralite FR-F”, Auburn, WA (888) 803-9533

2.2 PERFORMANCE DESIGN STANDARDS

A. Requirements apply simultaneously through the most adverse conditions of each exterior application.
1. **Windloads: Design system to withstand positive and negative windloads normal to the plane of the wall, up to, and including: Risk Category “III” / Exposure “C” /145 m.p.h. (3 sec. gust).**
2. Thermal Movement: Provide for noiseless expansion and contraction of all materials and assemblies due to temperature changes in a range between 10 degrees F and 180 degrees F without detriment to appearance or performance.
3. Water Infiltration: Drain water entering at joints and condensation occurring within the wall construction to the exterior face of the wall. Allow no uncontrolled water other than condensation on the interior face of the wall.

4. Air Infiltration: Limit air leakage to maximum 0.06 cfm per square foot of wall projected area (Storefront at 8 lb./sq.ft.):
   Risk Category "III" / Exposure "C" / 145 m.p.h. (3 sec. gust).

B. Aluminum Window Requirements Conformance to specifications in AAMA/NWWDA 101/I.S.2 when tests are performed on the prescribed 8'0" x 5'0" minimum test size with the following test results:

1. Air Infiltration: maximum .07 cfm/square foot when tested per ASTM E 283 at a static air pressure difference of 1.57 psf.
2. Water Penetration: no uncontrolled water leakage when tested per ASTM E 547 and ASTM E 331 at a static air pressure difference of 10 psf
3. Uniform Structural: window to be operable, and maximum .4% permanent deformation per member when tested per ASTM E 330 at a static air pressure difference of 67.5 psf.

2.3 MATERIALS

A. Aluminum:

1. Aluminum Alloys: Comply with the standards and designations of the Aluminum Association and the following ASTM Standards:
   a. Sheet and Plate: ASTM B209
   b. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221.
   c. Bars, Rods, and Wire: ASTM B211
   d. Standard Structural Shapes: ASTM B308
   e. Drawn Seamless Tube: ASTM B210
   f. Extruded Structural Pipe and Tubes: ASTM B429
   g. Welding Rods and Bare Electrodes: AWS Code
2. Aluminum Finish: Clear Anodized.
   a. Quality standard: conforming to AAMA 2604 for applied finishes or AAMA 661 for anodized finishes.
   b. Pretreatment: five-stage; zinc chromate conversion coating.
   c. Application: electrostatic spray and oven bake by approved applicator. d.Coating quantity: minimum one primer coat and one color coat.
   e. Dry film thickness: minimum 1.2 mils on exposed surfaces, except inside corners and channels.

3. Framing Color: Clear Anodized, to match existing building.

B. Steel:

1. Carbon Steel: Refer to the Structural Steel Section. Provide structural reinforcement as required.
2. Stainless Steel Fasteners: ASTM A167, type 302/304 No. 4 satin finish where exposed.
3. Metals used for shims shall be galvanized steel (ASTM A36 or ASTM A283) where noted as steel and stainless steel (300 Series) where noted as stainless steel. Do not use aluminum or plastic shims unless approved by the Project Manager.
4. Exposed Cladding, Trim and Panels: Provide cladding elements with formed edge flanges and backside stiffener members as required to maintain such flatness that when measured at room temperature the maximum slope of the surface at any point, measured from the nominal plane of the surface in its final installed position shall not exceed 1.25 degrees.
5. Metal Protection: Materials used as permanent or temporary protection for metals shall conform with the following standards:
   a. Bituminous Paint: FS TT-C-494 or MIL-P-6883A.
   b. Mastic Bulk Compound: FS SS-C-153, Type I or Type II.
   c. Preformed Mastic Tape: NAAMM Specifications for Non-Shrinking, Non- Resilient Performed Sealing Compound
   d. Zinc Rich Paint: MIL-P-38 336.

C. Glazing Materials at Hollow Metal Frames:

1. General: Use glazing compounds and preformed glazing sealants approved for the application and, except as otherwise specified, conforming to the Glazing Materials portion of FGMA Glazing Manual.
2. Sealant:
   a. One (1) part acrylic polymer sealant conforming to FS TT-S-00230 or silicone, FS TT-S-0023-C. Use for glazing of all fixed glass. Include primer as recommended by manufacturer.
   b. Color: To match frame.
   c. All sealants shall be compatible with adjacent material per manufacturer's instruction.
3. Setting Blocks: Hard rubber or plastic (as recommended by manuf.).
4. Back-up material: Foamed polyethylene or polystyrene rodstock, sizes as required by joint condition, and compatible with sealant.
5. Glazing Tape: DAP #1202 or as approved.

6. Glazing Gaskets: Extruded neoprene, free of porosity, surface defects, dimensional irregularities and conforming to physical properties of ASTM C509.
7. Use of metal sash putty will not be permitted, but compound conforming to FS T- G-410 will be permitted. The use of non-skinning compounds, non-resilient type preformed sealers, and preformed impregnated type gasket will not be permitted.

D. Glazing Materials at Aluminum Framing:

1. Glazing Gaskets: Extruded neoprene (Color: Black) sized to fit
2. Sealant: Comply with Federal Spec. TT-S-00230

E. Concealed Reinforcement Materials:

1. Steel:
   a. Carbon Steel: Refer to the structural steel section. Provide structural reinforcement as required.
   b. Metal Protection: Materials used as permanent or temporary protection for metals shall conform with the following standards:
      1) Bituminous Paint: FS TT-C-494 or MIL-P-6883A.
      2) Mastic Bulk Compound: FS SS-C-153, Type I or Type II.
      3) Preformed Mastic Tape: NAAMM Specifications for Non-Shrinking, Non-Resilient Performed Sealing Compound
      4) Zinc Rich Paint: MIL-P-38 336.

F. Glass:

1. General:
   a. Glass shall meet the requirements of ASTM C1036.
   b. Float Glass: Care shall be taken to minimize the tong marks and, unless indicated otherwise on the drawings, the tong marks shall occur at the bottom of the glass (after installation).
   c. All glass shall be heat strengthened unless noted otherwise.
   d. **Exterior glazing shall be PPG "Solar Green", Solarban 70 (or equal) tinted.**
   e. **Interior glazing shall be "clear", unless otherwise specified.**
   e. Safety Glazing: Subject to compliance with requirements, obtain safety glazing products permanently marked on each individual glass lite with certification label of manufacturer acceptable to authorities having jurisdiction. Safety glazing shall conform to ANSI Z97.1, Safety Performance Specification, and ANSI Z97.1, Safety Glass Code., and IBC 2406.1 as applicable.

g. Impact Resistant Glazing: Where indicated or otherwise required by code, provide laminated Impact-Resistant Glazing Units with 0.090 PVB inter-layer. Incorporate Impact Resistant glazing into insulated glass units where indicated or specified.

2. Exterior Glazing

a. **Exterior glazing at all locations except in exterior doors shall be 1-5/16" thick, Impact Resistant, insulated units, comprised of 9/16" impact resistant glass, Solarban 70, Solar Green Tinted, Low-E + 1/4" tempered glass, as specified.**

Provide spandrel units with opaque fritted glass at locations indicated.

NOTE: Prior to bidding, field verify proposed manufacturer's glazing will match existing building glazing.

NOTE: Provide samples of glazing units with submittals, for Architect and Owner to confirm match to existing building window openings.

b. **Exterior glazing at exterior doors shall be 9/16" thick, Impact Resistant, non-insulated units, 9/16" impact resistant glass, Solarban 70, Solar Green Tinted, Low-E, as specified.**

NOTE: Prior to bidding, field verify proposed manufacturer's glazing will match existing building glazing.

NOTE: Provide samples of glazing units with submittals, for Architect and Owner to confirm match to existing building window openings.

c. **Glass thickness (varies by location, assembly type, and code requirement)**

1) 1-5/16" thick Insulated Glass Units – Impact Resistant
2) 1-5/16" thick Insulated Spandrel Units – Impact Resistant
3) 9/16" thick Laminated Glass Units – Impact Resistant
4) 9/16" thick Laminated Glass Units – Rated + Impact Res.
5) 1/4" thick Clear Tempered Safety Glazing (only at units not required to be Rating or Impact Resistant

d. Safety Glazing: Provide tempered safety glazing at all openings where required by code, or otherwise indicated on the Drawings or in the Specifications.

3. Interior Glazing

a. Interior glazing at occupant security/lock down storefronts, doors, and view lites shall be 9/16" thick, Impact Resistant, non-insulated units, 9/16" impact resistant glass, Solarban 70, Solar Gray Tinted, Low-E, as specified.

b. Interior Glazing, Typical, except where indicated as Impact Resistant (IR) or Rated (R) or (FR): Provide 1/4 inch thick glazing quality, clear, tempered float glass, unless noted otherwise.

c. Safety Glazing: Provide tempered safety glazing at all openings where required by code, or otherwise indicated on the Drawings or in the Specifications.

d. Fire Rated Glass: Provide 5/16 inch, ceramic, premium clear fire rated glass; 20 minute, listed and labeled for hose stream and positive pressure. Rated for impact safety in accordance with CPSC 16CFR 1201 Cat. II (400 foot pounds).

d. Spandrel Glass: Provide 1/4 inch thick spandrel glass, with a colored lead-free ceramic frit, fire- fused to its interior surface to match tinted tempered float glass specified as Type G-1 above.

G. Exterior Impact Rated Aluminum Curtain Wall System: Kawneer Co., Inc., 1600 IR Series or equivalent product from list of approved manufacturers:

1. Structural Properties:
   a. Limit the dead load deflection of horizontal members supporting glass to 1/360 of the clear span with a 1/8 inch maximum deflection.
   b. Limit the deflection of any member in a direction parallel to the plane of the wall and of any corner mullion in both parallel and perpendicular directions to a maximum of 25 percent of the glass bite dimension and maintain a minimum of 1/8 inch clearance between the member and the edge of the glass, panel, or other component.

c. Limit the wind load deflection of any member to 1/240 plus 1/4 inch of the clear span, based on "pinned" ends.

d. Limit the wind load deflection of corner mullions to the span as specified above, with the specified pressure acting on one face of the building with no pressure acting on the adjacent face, or 1/2 the specified pressure acting on one face of the building with 1/2 the specified suction acting on the adjacent face, whichever is the greatest.

e. No wall element shall sustain permanent deflection of glass breakage under maximum design load.

f. The panels and their connections shall accommodate movements of the structure resulting from lateral forces. Provide connections with sufficient ductility to preclude brittle failure, at or near, welds.

g. Framing Sizes: 2-1/2" W x 7-1/4" D (impact resistant) where indicated on the drawings. Miter ends of horizontals to form segmented curve at commons.

h. **Finish: Kynar 500 or equivalent.**

H. ~~**Exterior Impact Resistant Aluminum and Glass Entrance Doors: Kawneer Co., Inc., Modified "Series 350T- IR" Thermally Broken Impact Resistant Swing Door Entrance**, or equivalent product from list of approved manufacturers.~~

1. ~~**Doors: Shall be 1-3/4" or 2-1/4" thick, consisting of 5"-6" high vertical stile, 5"-6" wide top rail and 12" high bottom rail aluminum tubular sections. Thickness as required to meet the design wind loads and impact resistance requirements.**~~
2. ~~**Finish: Kynar 500 or equivalent.**~~
3. ~~Connections:~~

   a. ~~Provide bolted and welded connections, fit to a hairline joint.~~
   b. ~~Provide reinforcing at bolted attachments. Tapped aluminum is not permitted.~~
   c. ~~Provide concealed screws, nuts, bolts, and anchors, except hardware screws on butt of door, of non-corrosive metal.~~

4. ~~**Exterior Door Glazing: Provide 9/16" thick impact rated glazing at all exterior door locations**. Deliver doors to job pre-glazed.~~
5. ~~Glazing Gaskets: Use manufacturer's recommended gaskets for flush glazing (color: Black).~~
6. ~~Hardware: Refer to Section 087100, Finish Hardware.~~

I. **Exterior Impact Rated Aluminum Storefront/Entrance Framing System: Kawneer Co., Inc., "Kawneer IR501T, Center Set,** or equivalent product from list of approved manufacturers:

1. Size 2 -1/2" face x 5" deep
2. **Finish: Kynar 500 or equivalent.**
3. Provide mullion reinforcement, if necessary, to achieve structural requirements.
4. Glass Pockets: Shall be sized to accept specified glass.
5. Provide sill receptors with end dams. (At all sill conditions.)

J. **Interior Aluminum Storefront/Entrance Framing System: Kawneer Co., Inc., "Kawneer 450, Center Set,** or equivalent product from list of approved manufacturers:

1. Size 1-3/4" face x 4-1/2" deep
2. **Finish: Kynar 500 or equivalent.**
3. Provide mullion reinforcement, if necessary, to achieve structural requirements.
4. Glass Pockets: Shall be sized to accept specified glass.
5. Provide sill receptors with end dams. (At all sill conditions.)

K. **Interior Aluminum Storefront/Entrance Framing System: Kawneer Co., Inc., "Kawneer 450, Center Set,** or equivalent product from list of approved manufacturers:

1. Size 1-3/4" face x 4-1/2" deep
2. **Finish: Kynar 500 or equivalent.**
3. Provide mullion reinforcement, if necessary, to achieve structural requirements.
4. Glass Pockets: Shall be sized to accept specified glass.
5. Provide sill receptors with end dams. (At all sill conditions.)

L. **Interior Aluminum and Glass Entrance Doors: Kawneer Co., Inc., "Series 350" Medium Stile Swing Door Standard Entrance** or equivalent product from list of approved manufacturers.

1. **Wide Stile Doors: Shall be 1-3/4" thick, consisting of 5"-6" wide vertical stiles, 5"-6" high top rail and 12" high bottom rail of aluminum tubular sections with minimum 0.125 inch thick nominal wall thickness (thicker if required for impact rating).**
2. **Finish: Kynar 500 or equivalent.**
3. Connections:

~~a. Provide bolted and welded connections, fit to a hairline joint.~~
~~b. Provide reinforcing at bolted attachments. Tapped aluminum is not permitted.~~
~~c. Provide concealed screws, nuts, bolts, and anchors, except hardware screws on butt of door, of non-corrosive metal.~~

4. **Exterior Door Glazing: Provide 9/16" laminated Impact Rated Glazing at all interior door locations where indicated. Deliver doors to job pre-glazed.**
5. **Interior Door Glazing: Provide 9/16" laminated or 1/4" thick tempered Safety Glazing at all interior door locations where indicated. Deliver doors to job pre-glazed.**
6. Glazing Gaskets: Use manufacturer's recommended gaskets for flush glazing (color: Black).
7. Mullion Stabilizer: Provide as required at double acting doors with removable mullion.
8. Hardware: Refer to Section 087100, Finish Hardware.

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain hardware templates from finish hardware supplier.

3.2 SURFACE CONDITIONS

A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Clean glazing channels, stops, and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.

1. Remove protective coatings which fail in adhesion or interfere with bond of sealants.
2. Comply with manufacturers' instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.
3. Prime surfaces to receive glazing compounds in accordance with manufacturer's recommendations.

3.3 INSTALLATION

A. Inspect each piece of glass immediately prior to start of installation.

1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or damaged in any other manner.
2. Do not remove labels from glass until so directed by the Project Manager.
3. Install glass so distortion waves, if present, run in the horizontal direction.

B. Locate setting blocks at sills one quarter of the width of the glass in from each end of the glass, unless otherwise recommended by the glass manufacturer.

1. Use blocks of proper size to support the glass in accordance with the manufacturer's recommendations.
2. Provide spacers for all glass sizes larger than 50 united inches, to separate glass from stops; except where continuous glazing gaskets or felts are provided.

a. Locate spacers no more than 24 inches apart, and no closer than 12 inches to a corner.
b. Place spacers opposite on another.
c. Make bite of spacer on glass ¼ inch or more.

C. Set glass in a manner which produces the greatest possible degree of uniformity in appearance.

D. Do not use two (2) different glazing materials in the same joint system unless the joint use is approved in advance by the Project Manager.

E. Mask, or otherwise protect, surfaces adjacent to installation or sealants.

F. Install all glass, gasket, aluminum framing, [aluminum horizontal sliding window] [and] [ticket window] in accordance with manufacturer's printed instructions. Installed windows units shall conform to AAMA 502 minimum requirements for air and water infiltration.

G. Caulk joints where indicated to meet performance Design Standards using materials specified in Sealants section. Follow sealant manufacturer's printed instructions for the installation of his product.

H. Erection Tolerances:

1. Maximum Deviation from Vertical: 1/8 inch in any story and 1/4 inch in any 45 foot run.
2. Maximum Deviation from Horizontal: 1/8 inch in any 30 foot run.
3. Maximum Deviation from True Alignment: 1/32 inch for any two (2) abutting units. Allow no edge projections.

4. Maximum Joint Gap: 1/32 inch.
5. Maximum Openings Between Movable Glazing Stop and Adjacent Member: 1/32 inch.

3.4 PROTECTION AND ADJUSTMENTS

A. Protect glass from breakage after installation by promptly installing streamers or ribbons, suitably attached to the framing and held free from glass. Do not apply warning markings, streamers, ribbons, or other items directly to the glass.

B. Adjust windows as necessary for smooth and weather tight operation, and leave windows clean and free of construction debris.

END OF SECTION 088100

SECTION 092513 – DIRECT APPLIED SYNTHETIC STUCCO SURFACING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Weather resistant surfacing system utilizing a polymer modified cementitious base coat, heavy reinforcing mesh layer, and sand-textured 100% acrylic polymer exterior finish coat.

1.2 RELATED WORK

A. All Sections of work built-in, adjacent to, applied to, affecting or affected by Work of this Section.

1. Specification Section 04200 “Unit Masonry”

1.3 SUBMITTALS

A. Product Data: Manufacturer’s specifications and other data needed to verify compliance with specified requirements.

1.5 WARRANTY

A. Warrant the work specified for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

1.01 SUBMITTALS

A. Submit under provisions of Specification Section 013300 “Submittal Procedures”.

B. Product Data: Provide product data on Direct Applied Synthetic Stucco System materials, product characteristics, performance criteria, limitations, and installation requirements.

C. Samples: Submit five (5) 12”x12” size samples of Direct Applied Synthetic Stucco Surfacing System illustrating finish coat custom color and texture(s).

D. Certificate: System manufacturer's approval of applicator.

E. Sealant: Sealant manufacturer's certificate of compliance with ASTM C1382.

F. System manufacturer's current specifications, typical details, system overview and related product literature which indicate preparation required, storage, installation techniques, jointing requirements and finishing techniques.

1.02 QUALITY ASSURANCE

A. Manufacturer: More than 10 years in the industry, with more than 1000 completed projects.

B. Applicator: Approved and factory certified by Manufacturer to performing installation of products specified in this section.

C. Regulatory Requirements: Conform to applicable code requirements.

D. Material Characteristics and Testing References Matrix follow this section.

E. Field Samples:

1. Construct one field sample panel for each color and texture, 5 feet x 5 feet in size of system materials illustrating method of attachment, surface finish, and selected color(s) and texture(s).
2. Prepare each sample panel using the same tools and techniques to be used for the actual application.
3. Locate sample panel where directed.
4. Accepted sample panel <u>will not</u> remain as part of the work.
5. Field samples shall be constructed to include all wall assembly components including CMU substrate, polymer modified synthetic cement base coat, heavy-duty reinforcing mesh, primer (if recommended or required by the manufacturer, sand textured finish coat, typical sealant joint, and typical flashing conditions.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's instructions.

B. Deliver materials in original unopened packages with manufacturer's labels intact.

C. Protect materials during transportation and installation to avoid physical damage.

D. Store materials in a cool, dry place protected from freezing. Store materials at no less than 40°F/4°C. In cold weather, keep containers at room temperature for at least 24 hours before using.

E. Store reinforcing mesh, flexible flashing, and other materials in a cool, dry place protected from exposure to moisture.

1.04 PROJECT/SITE CONDITIONS

A. Do not apply material in ambient temperatures below 40°F/4°C (50°F/10°C), or as recommended by manufacturer.

B. Provide properly vented, supplementary heat during installation and drying period when temperatures less than 40°F/4°C (50°F/10°C), or as recommended by manufacturer, prevail.

C. Do not apply in ambient temperature above 100°F (38°C) or surface temperature above 120°F (49°C), or as recommended by manufacturer.

D. Do not apply materials to frozen surfaces.

E. Maintain ambient temperature at or above 40°F/4°C (50°F/10°C), or as recommended by manufacturer, during and at least 24 hours after material installation and until dry.

F. Under average conditions [70 °F (21 °C), 50% Relative Humidity] finish will be dry within 24 hours. Drying time is dependent on humidity, air temperature, sun exposure, surface conditions and finish thickness. Lower temperature, higher humidity and application in shaded areas will extend drying time. Protect finish from rain or other precipitation and temperatures less than 40°F (4°C) for a minimum of 24 hours or until dry.

1.05 SEQUENCING AND SCHEDULING

A. Coordinate and schedule installation of Direct Applied Synthetic Stucco Surfacing System with related work of other sections.

B. Coordinate and schedule installation of trim, flashing, and joint sealers to prevent water infiltration behind the existing system.

C. Coordinate and schedule installation of windows, doors, A/C units, air seals etc. if being removed and replaced.

1.06 WARRANTY

A. Provide Manufacturer's standard warranty for Direct Applied Synthetic Stucco Surfacing System installations under provisions of Section 010700.

B. Comply with Senergy application instructions and notification procedures to assure qualification for warranty.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Basis Of Design: SENERGY Surfacing System manufactured by Sika Corporation.

B. Equal systems, properly submitted and reviewed prior to bidding, approved, and listed in Addendum shall be considered equal, and approved for use.

2.01 MATERIALS

A. Air/Water-Resistive Barrier Components:

1. Air/Water-Resistive Barrier:

~~a. SENERGY SENERSHIELD-R: A one-component fluid-applied vapor permeable air/water-resistive barrier.~~
~~b. SENERGY SENERSHIELD-RS: A one-component fluid-applied vapor permeable air/water-resistive barrier for use with airless spray equipment.~~
c. SENERGY SENERSHIELD-VB: A one-component fluid-applied vapor impermeable air/water-resistive barrier.

2. Self-adhering flashing.

a. **SIKAWALL FLASH SEAL NP Transitional Membrane / Expansion Joint Flashing: A 32-mil thick self-adhering and self-sealing composite membrane of polyester fabric and butyl adhesive. Compatible with Senergy liquid air/weather-resistive barriers.**

B. Surface Primer (if required my manufacturer for the installation over substrate)

1. **SIKAWALL SURFACE STABILIZER WB Adhesion Promoter (For painted, glazed or chalky surfaces): To prepare glazed or chalky, previously painted masonry surfaces that will receive a Senergy Surfacing System.**

C. Base Coats:

1. ~~SENERGY ALPHA Base Coat: A 100% acrylic based adhesive and base coat, field-mixed with Portland cement. It has a creamy texture that is easily spread.~~
2. ~~SENERGY ALPHA DRY Base Coat: A dry-mix polymer adhesive and base coat containing Portland cement and requiring only water for mixing.~~
3. ~~SENERGY XTRA-STOP Base Coat: A 100% acrylic-based, water-resistant adhesive and base coat, field-mixed with Portland cement.~~
4. **SENERGY ALPHA GENIE Base Coat: A 100% acrylic, fiber-reinforced base coat, adhesive and leveler that is field-mixed with Portland cement. Recommended over CMU and brick to reduce mortar joint telegraphing.**

D. Portland cement: Conform to ASTM C150, Type I, IL (ASTM C595), II, or I/II, grey or white; fresh and free of lumps.

E. Water: Clean and potable without foreign matter.

F. **FLEXGUARD 4 Reinforcing Mesh: (Required) A 4 oz balanced, open-weave glass, fiber reinforcing mesh, twisted multi-end strands treated for compatibility with Senergy base coats**

G. **SIKAWALL TINTED PRIMER: A 100% acrylic-based primer that helps alleviate shadowing and enhances the performance of Senergy wall systems. Color to closely match the selected Senergy finish coat.**

H. Finish Coat:

1. ~~SENERFLEX Finish: 100% acrylic polymer finishes with advanced technology to improve long-term performance and dirt pick-up resistance; air cured, compatible with base coat; Senergy finish color [ ] as selected; finish texture:~~
   a. ~~FINE: utilizes uniformly sized aggregates for a uniform, fine sand texture.~~
   b. ~~CLASSIC: Has a medium "worm-holed" appearance which is achieved by the random aggregate sizes in the finish. The "worm-holed" look can be circular, random, vertical or horizontal.~~
   c. ~~TEXTURE: can achieve a wide variety of free-formed, textured appearances, including stipple and skip-trowel~~
   d. ~~SAHARA: Provides a uniform, "pebble" appearance.~~

2. **SENERFLEX TERSUS Finish: Modified acrylic-based finish with water repellent properties, compatible with base coat; Senergy finish color as selected; finish texture:**

    a. FINE: utilizes uniformly sized aggregates for a uniform, fine sand texture.
    ~~b. CLASSIC: Has a medium "worm-holed" appearance which is achieved by the random aggregate sizes in the finish. The "worm-holed" look can be circular, random, vertical or horizontal.~~
    ~~c. TEXTURE: can achieve a wide variety of free-formed, textured appearances, including stipple and skip-trowel~~
    ~~d. SAHARA: Provides a uniform, "pebble" appearance.~~

~~3. SikaWall Specialty Finishes: 100% acrylic polymer finishes that can be hand-troweled to simulate stone or create a time-honored, mottled tone-on-tone look that achieves a soft and weathered patina over time.~~

    ~~a. SIKAWALL ENCAUSTO VERONA: Utilizes uniformly sized aggregate to achieve a free-formed, flat texture. It can be used to achieve a mottled look and unlimited tone on tone designs by combining multiple colors.~~
    ~~b. SIKAWALL METALLIC: Has a pearlescent appearance. It utilizes uniformly sized aggregates for a uniform fine texture.~~
    ~~c. SIKAWALL GRANITE & STONE: Is a factory-mixed, reflective stone finish consisting of colored aggregate and large black mica flakes in a 100% acrylic transparent binder that provides a classic granite or marble-like textured finished appearance.~~

~~4. SIKAWALL CHROMA Finish: 100% acrylic polymer-based finish with integrated high performance colorants for superior fade resistance, compatible with base coat; Senergy finish color [ ] as selected; finish texture:~~

    ~~a. F1.0: Utilizes uniformly sized aggregates for a uniformly fine texture.~~
    ~~b. M1.5: Provides a uniform "pebble" appearance.~~
    ~~c. R1.5: Has a medium "worm-holed" appearance which is achieved by the random aggregate sizes in the finish. The "worm-holed" look can be circular, random, vertical or horizontal.~~

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive Senergy Surfacing System and verify that substrate and adjacent materials are dry, clean, cured, sound and free of releasing agents, paint, or other residue or coatings. Verify substrate surface is flat, free of fins or planar irregularities greater than 1/4" in 10'.

B. Ensure adhesion tests meet the requirements listed in the *Basics of Conducting Adhesion Testing Senergy* technical bulletin.

C. Fill large voids and irregularities with appropriate parging or cement mortar materials. Senergy ALPHA GENIE Base Coat can be applied at a maximum thickness of 1/4" (6.4 mm) to fill small voids and help level the surface. Other Senergy base coats can be applied at a maximum thickness of 1/8" (3.2 mm), to fill small voids and help level the surface.

D. Control/Expansion joint type and placement shall be the responsibility of the architect/engineer and substrate manufacturer.

E. Unsatisfactory conditions shall be reported to the general contractor and corrected before application of the Senergy Surfacing System.

3.02 PREPARATION

A. Substrate Systems:

1. Acceptable substrates are Concrete Masonry Units (excluding fluted block; split faced block should be assessed on project by project basis) brick and concrete walls.
2. Painted and otherwise coated surfaces should be inspected and prepared as approved by Sika before application. The applicator shall verify that the proposed substrate is acceptable prior to the Senergy Surfacing System installation.

B. System Joints

1. It is the sole responsibility of the project design team, including the architect, engineer, etc., to ultimately determine specific expansion joint placement, width and design. Detail specific locations in construction drawings.

2. Sealant joints are required at all penetrations through the Senergy Surfacing System.
3. For a list of acceptable sealants refer to *Acceptable Sealants for use with Senergy Wall Systems* technical bulletin.

C. All surfaces to receive Senergy Surfacing System components must be clean, dry and free of airborne contaminants.

D. Protect all surrounding areas and surfaces from damage and staining during application of Senergy Surfacing System.

E. Protect finished work at end of each day to prevent water penetration.

3.03 MIXING

A. General: No additives are permitted unless specified in product mixing instructions. Close containers when not in use. Prepare in a container that is clean and free of foreign substances. Do not use a container which has contained or been cleaned with a petroleum-based product. Clean tools with soap and water immediately after use.

B. Air/Water-Resistive Barriers: SENERSHIELD-R/RS/VB: Mix with a clean, rust-free paddle and drill until thoroughly blended. Do not add water.

C. SURFACE STABILIZER WB: Mix the contents of the pail with a low speed drill and clean paddle mixer until thoroughly blended.

D. Senergy Base Coat:

1. ALPHA Base Coat: Mix base coat with a clean, rust-free paddle and drill until thoroughly blended, before adding Portland cement. Mix one-part (by weight) Portland cement with one-part base coat. Add Portland cement in small increments, mixing until thoroughly blended after each additional increment. Clean, potable water may be added to adjust workability.

2. XTRA-STOP Base Coat: Mix base coat with a clean, rust-free paddle and drill until thoroughly blended, before adding Portland cement. Mix one-part (by weight) Portland cement with one-part base coat. Add Portland cement in small increments, mixing until thoroughly blended after each additional increment. Clean, potable water may be added to adjust workability.

3. ALPHA GENIE Base Coat: Mix base coat with a clean, rust-free paddle and drill until thoroughly blended, before adding Portland cement. Mix one-part (by weight) Portland cement with one-part base coat. Add Portland cement in small increments, mixing until thoroughly blended after each additional increment. Clean, potable water may be added to adjust workability.

4. ALPHA DRY Base Coat: Mix and prepare each bag in a 5-gallon (19-liter) pail. Fill the container with approximately 1.5-gallons (5.6-liters) of clean, potable water. Add base coat in small increments, mixing after each additional increment. Mix base coat and water with a clean, rust-free paddle and drill until thoroughly blended. Additional ALPHA DRY Base Coat or water may be added to adjust workability.

E. SIKAWALL TINTED PRIMER: Mix the factory-prepared material with a clean, rust-free paddle and drill until thoroughly blended. A small amount of clean, potable water may be added to adjust workability. Do not overwater.

F. Finish:

1. SENERFLEX, SENERFLEX TERSUS, CHROMA, and ENCAUSTO VERONA Finish: Mix the factory-prepared material with a clean, rust-free paddle and drill until thoroughly blended. A small amount of clean, potable water may be added to adjust workability. Do not overwater.

2. SIKAWALL GRANITE & STONE Finish: Gently mix the contents of the pail for 1 minute using a low RPM ½" drill equipped with a mixing paddle such as a Demand Twister or a Wind-Lock B-MEW, B-M1 or B-M9.

3.04 APPLICATION

A. Air/Water-Resistive Barrier: Apply SENERSHIELD-R/-RS/-VB per the published application instruction in the technical data sheet.

B. SURFACE STABILIZER WB: Apply evenly and uniformly over the entire wall surface. Surface shall be uniformly coated, free from voids, pinholes or blisters. Apply with a wide nylon bristle brush or 1/2" to 3/8" (6.4 to 9.5 mm) nap roller. Protect from rain and wash-off until the specified system is installed.

C. Senergy Base Coat/ Optional Reinforcing Mesh: Base coat shall be applied to achieve reinforcing mesh embedment with no reinforcing mesh color visible.

1. Apply mixed Senergy base coat to entire surface of the substrate with a stainless-steel trowel to provide a smooth level base for finish application.

   Note: Multiple layers of base coat may be required to completely level/cover mortar joints in CMU or brick applications.

2. If reinforcing mesh is selected, immediately place FLEXGUARD 4 reinforcing mesh against wet base coat and embed the reinforcing mesh into the base coat by troweling from the center to the edges.
3. Lap reinforcing mesh 2-1/2" (64 mm) minimum at edges.
4. Ensure reinforcing mesh is continuous at corners, void of wrinkles and embedded in base coat so that no reinforcing mesh color is visible.
5. If required, apply a second layer of base coat to achieve total nominal base coat/reinforcing mesh thickness of 1/16" (1.6 mm).
6. Allow base coat with embedded reinforcing mesh to dry hard (normally 8 to 10 hours).

D. SIKAWALL TINTED PRIMER:

1. Apply primer to the base coat/reinforcing mesh with a sprayer, ⅜" (10 mm) nap roller, or good quality latex paint brush at a rate of approximately 150-250 ft^2 per gallon (3.6–6.1m^2 per liter). Primer shall be dry to the touch before proceeding to the Senergy finish coat application.

~~E. Finish Coat: SENERFLEX, SENERFLEX TERSUS and CHROMA.~~

~~1. Apply finish directly to the base coat with a clean, stainless steel trowel.~~
~~2. Apply and level finish during the same operation to a minimum obtainable thickness consistent with uniform coverage. Maintain a wet edge on finish by applying and texturing continually over the wall surface.~~
~~3. Work finish to corners, joints or other natural breaks and do not allow material to set up within an uninterrupted wall area. Float finish to achieve final texture.~~

~~F. SIKAWALL GRANITE & STONE:~~

~~1. Apply SIKAWALL TINTED PRIMER to the substrate in accordance with the current product bulletin. Primer shall be of the corresponding color for the selected finish color. Allow the primer to dry to the touch before proceeding with finish application.~~
~~2. Apply a tight coat of finish with a clean, stainless steel trowel. Maintain a wet edge on finish by applying and leveling continually over the wall surface.~~
~~3. Work finish to corners, joints or other natural breaks and do not allow material to set up within an uninterrupted wall area. Allow first coat to set until surface is completely dry prior to applying a second coat of finish.~~

~~4. Use a stainless-steel trowel and apply the second coat of finish. Achieve final texture using circular motions. Total thickness of finish may be between 1/16" (1.6 mm) and 1/8" (3.2 mm).~~

3.05 CLEANING

A. Clean work under provisions of Section 017400.

B. Clean adjacent surfaces and remove excess material, droppings, and debris.

3.06 PROTECTION

A. Protect materials from rain, snow and frost for 48-72 hours following application.

B. Under average conditions [70 °F (21 °C), 50% Relative Humidity] finish will be dry within 24 hours. Drying time is dependent on humidity, air temperature, sun exposure, surface conditions and finish thickness. Lower temperature, higher humidity and application in shaded areas will extend drying time. Protect finish from rain or other precipitation and temperatures less than 40°F (4°C) for a minimum of 24 hours or until dry.

C. Protect installed construction under provisions of Section 017600.

TEST	METHOD	CRITERIA	RESULTS
Surface Burning	ASTM E84 / UL 723	Flame spread < 25 Smoke developed < 450	All components of the system meet Class A performance (FS < 25; SD < 450)
Water resistance of Coatings in 100% R.H.	ASTM D2247	No deleterious effects after 14 days	Pass
Freeze/Thaw Resistance	ASTM E2485	No deleterious effects at 10 cycles viewed under 5x magnification	Pass at 60 cycles
Salt Fog Resistance	ASTM B117	No change after 300 hours	Pass
Mildew Resistance	Mil. Std. 810B Method 508	No fungus growth after 28 days	Pass
Abrasion Resistance	ASTM D968	Finish Coat not worn through after 500 liters of falling sand	Pass after 686 liters of sand
Accelerated Weathering	ASTM G53	No deleterious effects after 7500 hours	Pass
Accelerated Weathering	ASTM G23	No deleterious effects after 2000 hours	Pass
Tensile Bond	ASTM C297, E2134	Greater than 15 psi	Pass
Alkali Resistance of Reinforcing Mesh	ASTM E2098	Greater than 120 pli retained strength after exposure	All weights of meshes pass

1. Surfacing System with Senerflex Tersus Finish

TEST	METHOD	CRITERIA	RESULTS
Surface Burning	ASTM E84 / UL 723	Flame spread < 25 Smoke developed < 450	All components of the system meet Class A performance (FS < 25; SD < 450)
Water resistance of Coatings in 100% R.H.	ASTM D2247	No deleterious effects after 14 days	Pass
Freeze/Thaw Resistance	ASTM E2485	No deleterious effects at 10 cycles viewed under 5x magnification	Pass at 60 cycles
Salt Fog Resistance	ASTM B117	No change after 300 hours	Pass
Mildew Resistance	Mil. Std. 810B Method 508	No fungus growth after 28 days	Pass
Abrasion Resistance	ASTM D968	Finish Coat not worn through after 500 liters of falling sand	Pass
Accelerated Weathering	ASTM G53	No deleterious effects after 7500 hours	Pass
Accelerated Weathering	ASTM G23	No deleterious effects after 2000 hours	Pass
Dirt Collection	ASTM D3719	61 days at 45° South exposure Dc Index = 99.0 (100 = Best Performance)	Pass
Dirt Pickup Resistance	Miami Dade County TAS 143-95 section 7.8 (modified)	Greater than 90% reflectance retained after dirt pickup	Pass
Tensile Bond	ASTM C297, E2134	Greater than 15 psi	Pass
Alkali Resistance of Reinforcing Mesh	ASTM E2098	Greater than 120 pli retained strength after exposure	All weights of meshes pass

2. General Air/Water-Resistive Barrier Minimum Performance:

TEST	METHOD	CRITERIA	RESULTS
Water-resistive barrier coatings used under EIFS	ASTM E2570		Meets all performance requirements
Air Leakage of Air Barrier Assemblies	ASTM E2357	0.2 l/(s.m^2) @75 Pa (0.04 cfm/ft^2 @ 1.57 psf)	0.0007 l/s.m^2 (0.0001 cfm/ft^2) @ 75 Pa (1.57 psf) positive / post conditioning 0.0014 l/s.m^2 (0.0003 cfm/ft^2) @ 75 Pa (1.57 psf) negative / post conditioning
Air Permeance of Building Materials	ASTM E2178	0.02 l/(s.m^2) @75 Pa (0.004 cfm/ft^2 @ 1.57 psf)	0.0049 l/s.m^2 @ 75 Pa (0.00098 cfm/ft^2 @ 1.57 psf)
Rate of Air Leakage	ASTM E283		0.0185 l/s·m^2 @ 75 Pa (0.0037 cfm/ft^2 @ 1.57 psf)
Water Vapor Transmission	ASTM E96	Report value	Senershield-R - 18 Perms (grains/Hr. in Hg. ft^2) @ 10 mils wet film thickness Senershield-RS 18 Perms (grains/Hr. in Hg. ft2) @ 12 mils wet film thickness Senershield-R/RS - 14 Perms (grains/Hr. in Hg. ft^2) @ 20 mils wet film thickness Senershield-VB - 0.09 Perms (grains/Hr. in Hg. ft^2) @ 26 mils wet film thickness
Pull-Off Strength of Coatings	ASTM D4541	Min. 110 kPa (15.9 psi) or substrate failure	Pass - Tested over exterior gypsum sheathing, ASTM C1177 glass-mat sheathing, cement board, OSB, plywood; PVC and galvanized flashing
Nail Sealability (without Sheathing Fabric)	ASTM D1970	No water penetration at galvanized roofing nail penetration under 127 mm (5") head of water after 3 days at 4° C (40° F)	Pass
Surface Burning	ASTM E84	Flame Spread < 25 Smoke Development < 450	Meets Class A: Flame spread =15 Smoke developed = 95

3. Air/Water-Resistive Barrier ICC-ES AC-212:

TEST	METHOD	CRITERIA	RESULTS
Sequential Testing: 1. Structural 2. Racking 3. Restrained Environmental Conditioning 4. Water Penetration	1. ASTM E 1233 Procedure A 2. ASTM E 72 3. ICC-ES AC-212 4. ASTM E 331	No cracking at joints or interface of flashing No water penetration after 15 min @ 137 Pa (2.86 psf)	Pass - Tested over OSB and gypsum sheathing No water penetration after 90 min @ 299 Pa (6.24 psf)
Sequential Testing: 1. UV Light Exposure 2. Accelerated Aging 3. Hydrostatic Pressure Test	1. ICC-ES AC-212 2. ICC-ES AC-212 3. AATC C 127-1985	No cracking or bond failure to substrate No water penetration after 21.7 in (550 mm) water for 5 hours	Pass
Freeze-Thaw	ASTM E 2485 (Method B)	No sign of deleterious effects after 10 cycles	Pass - Tested over exterior gypsum sheathing, ASTM C1177 glass-mat sheathing, cement board, OSB, plywood
Water Resistance	ASTM D2247	No deleterious effects after 14 day exposure	Pass - Tested over exterior gypsum sheathing, ASTM C1177 glass-mat sheathing, cement board, OSB, plywood
Tensile Bond	ASTM C 297	Minimum 103 kPa (15 psi)	Pass - Tested over exterior gypsum sheathing, ASTM C1177 glass-mat sheathing, cement board, OSB, plywood, CMU; PVC and galvanized flashing
Tensile Bond (after freeze-thaw)	ASTM C 297	Minimum 103 kPa (15 psi) avg; no failure after 10 cycles freeze-thaw	Pass

4. Air/Water-Resistance Barrier ICC-ES AC 148:

TEST	METHOD	CRITERIA	RESULTS
Sequential Testing: 1. UV Light Exposure 2. Accelerated Aging 3. Hydrostatic Pressure Test	1. ICC-ES AC 148 2. ICC-ES AC 148 3. AATCC 127-1985	No cracking or bond failure to substrate No water penetration after 21.7 in (550 mm) water for 5 hours	Pass
Peel Adhesion	ASTM D 3330 Method F	After UV Exposure After Accelerated Aging After Elevated Temperature Exposure After Water Immersion	Pass - tested over ASTM C1177 glass-mat sheathing, OSB, plywood, PVC and uncoated aluminum
Nail Sealability after Thermal Cycling	ASTM D 1970 (Modified), AAMA 711	No water penetration at galvanized roofing nail penetration under 31 mm (1.2”) head of water after 24 hours at 4° C (40° F)	Pass
Tensile Strength after UV Exposure	ASTM D 5034, AAMA 711	Minimum 0.5 N/mm (2.9 lbs./in)	Pass
Cold Temperature Pliability	ASTM D 1970, AAMA 711	No cracking after bending around a 25 mm (1”) mandrel after 2-hour exposure to -18° C (0° F)	Pass
Resistance to Peeling	AAMA 711	No signs of distress or failure after 24 hours of exposure at room temperature, 50° C (122° F), 65° C (149° F), 80° C (176° F)	Pass

END OF SECTION 092400

SECTION 092600 - GYPSUM BOARD ASSEMBLIES & FRAMING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard.
2. Rated gypsum wall assemblies.
3. Rated gypsum ceiling assemblies.
4. Tile backing panels.
5. Non-load-bearing steel framing.
6. Fiberglass Thermal Batt Insulation
7. Fiberglass Sound Attenuation Batt Insulation
8. Aluminum Gypsum Drywall Trim Accessories

1.2 SUBMITTALS

A. Product Data: For each product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 FIRE RATED ASSEMBLIES

A. **Refer to Specification Section 078998 “Rated Assemblies & Smoke Partitions” for requirements for these types of assemblies.**

B. **Refer to Specification Section 078999 “Rated Construction Test Assemblies” for copies of the U.L. Assemblies utilized in this project, and the specific requirements associated with these systems.**

C. **Comply with the specific requirements of each U.L. Construction Test Assembly, as if included in the Drawings and Details.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Load Bearing Metal Framing Products:

1. Clark Dietrich
2. Marino/Ware
3. MBA Metal Framing
4. Studco USA
5. Cesco Limited
6. Cemco
7. U.S. Frame Factory
8. Approved Equal.

B. Non-Load Bearing Metal Framing Products:

1. Clark Dietrich
2. Marino/Ware
3. MBA Metal Framing
4. Studco USA
5. Cesco Limited
6. Cemco
7. U.S. Frame Factory
8. Approved Equal.

C. Gypsum Board Panel Products.

1. US Gypsum
2. Georgia Pacific
3. National Gypsum Company
4. Approved Equal.

D. Aluminum Trim Accessories:

1. Fry Reglet
2. Approved Equal.

E. Unfaced Fiberglass Batt Thermal Insulation:

1. Owens Corning
2. Knauf.
3. Johns Manville

F. Unfaced Sound Attenuation Batts & Blankets:

1. Owens Corning
2. Knauf
3. Johns Manville

2.2 NON-LOAD BEARING STEEL FRAMING

A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.

1. Where metal stud, track, and other framing gauges are listed, indicated, or otherwise provided, nominal gauge framing materials shall be provided, and not "equivalent" thicknesses.

NOTE: Equivalent Gauge (EQ), or other similar faming components of any proprietary name or designation are NOT approved for use on this project, unless / except where specifically noted.

2. Interior wall, ceiling, and miscellaneous stud framing, and furring:

a) Refer to Drawings and Details for sizes and gauges required.
b) In no case shall framing be less than 20 gauge.
c) "Equivalent" or "EQ" stud framing materials shall not be utilized, unless specifically called out as so.

3. Exterior Load Bearing wall, ceiling, and miscellaneous stud framing and furring:

a) Refer to drawings and section details for framing member sizes, gauges, and spacing required.

2. Exterior Non-Load Bearing wall, ceiling, and miscellaneous stud framing and furring:

a) Refer to drawings and section details for framing member sizes, gauges, and spacing required.

3. Interior Load Bearing wall, ceiling, and miscellaneous stud framing, and furring:

a) Refer to drawings and section details for framing member sizes, gauges, and spacing required.

4. Interior Non-Load Bearing wall, ceiling, and miscellaneous stud framing, and furring:

a) Refer to drawings and section details for framing member sizes, gauges, and spacing required.

2.3 GYPSUM PANEL PRODUCTS

A. Panel Size, General: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.

1. Gypsum Wall Panels in types and thicknesses indicated herein, or as indicated on the Drawings and details, with long edges tapered.

a) 5/8" Type-X, Fire Rated + Mold & Moisture Resistant Gypsum Board
b) 5/8" Type-X, High-Abuse + Mold & Moisture Resistant Gypsum Board

Note: At all locations where gypsum board is indicated at interior locations, whether or not specifically noted, provide and install 5/8" Type-X Mold & Moisture Resistant Gypsum Board Panels.

Note: At all exterior and interior walls, provide and install 5/8" Type-X, High-Abuse + Mold & Moisture Resistant Gypsum Board to 4'-0" A.F.F., and 5/8" Type-X, Fire Rated Gypsum Board Above 4'-0" A.F.F.

Note: At all locations where exterior gypsum sheathing is indicated, provide and install 5/8" Type-X Dens Glass Gold or equivalent gypsum sheathing.

2. Gypsum Liner Panels: ASTM C442, C1396 in thickness indicated.

a) 1" Type-X Core Board, specifically for use with C-T stud framing system at rated wall and ceiling assemblies.

C. Tile Backing Panels:

1. Cementitious Backer Units: ANSI A118.9, in thickness indicated.

a) Install 5/8" thick panels at all walls scheduled to receive ceramic or porcelain tile.

2. Cementitious Backer Units: Shall be one of the 2 below manufacturers. Installed with EdgeGuard, 4' x 8' x 5/8" thickness and installed with hot-dipped galvanized or stainless steel screws.

a. National Gypsum Permabase
b. USG Durock

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners.
2. Expansion (Control) Joint: Use at intervals indicated on drawings, or as recommended by Gypsum Board manufacturer.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Products:

a) Fry Reglet Corp: As indicated in drawings.

2.5 SOUND ATTENUATION BLANKETS (To be installed at all interior partitions.):

A. Interior Partition Batting: Install 3-1/2", 6", 8", or 12" thickness (as indicated) fiberglass acoustical batt insulation to match wall thickness at interior walls, where indicated or scheduled - ASTM C 665, Type II, Class C. Acoustic batt insulation shall be part of a documented wall construction attaining a 36 STC at minimum and shall be part of a rated wall construction where required.

B. Unfaced Glass Fiber Insulation.

1. NRC coefficient: 1.00
2. Thickness: 3-1/2", 6", 8", or 12" thickness (as indicated)
3. Flame Spread: 10
4. Smoke Development: 10

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by manufacturer.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 NON-LOAD-BEARING STEEL FRAMING INSTALLATION

A. General: Comply with ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Suspended Ceiling and Soffit Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.

4. Screw furring to wood framing.

5. Wire-tie or clip furring channels to supports**,** as required to comply with requirements for assemblies indicated.
6. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

C. Partition and Soffit Framing:

1. Where studs are installed directly against exterior walls, install isolation strip between studs and wall.
2. Extend partition framing full height to structural supports or substrates above suspended ceilings at 4’-0” intervals, otherwise terminate at 6” obove ceiling height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
3. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. 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. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

4. 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.

3.2 PANEL PRODUCT INSTALLATION

A. Gypsum Board: Comply with ASTM C 840 and GA-216.

1. Space screws a maximum of 12 inches o.c. for vertical applications.
2. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.
3. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
4. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
5. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
6. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.
7. Laminating to Substrate: Comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

B. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Install with 1/4-inch gap where panels abut other construction or penetrations.
2. Glass-Mat, Water-Resistant Backing Panel: Install with 1/4-inch gap where panels abut other construction or penetrations.
3. Cementitious Backer Unit Application: ANSI A108.11.

3.3 FINISHING

A. Installing Trim Accessories: For 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.

B. Finishing Gypsum Board Panels: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

1. Prefill open joints and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
3. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
4. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

C. Cementitious Backer Units: Finish according to manufacturer's written instructions.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 4 Finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface.

END OF SECTION 092600

SECTION 093100 - CERAMIC AND PORCELAIN TILE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Porcelain floor tile.
2. Glazed ceramic wall tile.
3. Quarry floor tile.
4. Stone thresholds installed as part of tile installations.
5. Waterproofing and Crack Prevention membrane at tile floors and walls.
6. Cementitious backer units installed as part of floor and wall tile installations.
7. Grouting Materials and Additives.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples:

1. Each type, composition, color, and finish of tile.
2. Stone thresholds.

1.3 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. 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.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. Manufacturers:
1. DalTile
2. Prior Approved Equal

B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. **Porcelain Floor Tile and Base (typical all areas where scheduled):**
***** To Match SOWELA Facility Standard – NO SUBSTITUTIONS *****

1. **DalTile Continental Slate Color Body Porcelain Tile**
2. **Color: #CS57 "English Grey"**
3. **Module Size: 18"x18".**
4. **Surface: Slip-resistant finish.**
5. **Nominal Thickness: 5/16"**
6. **Grout Joint: 3/16", or as recommended by Manufacturer.**
Note: Provide knife edge joints at breaks in sloped floors.
7. **Pattern: Square / Straight Lay / 0% Offset**
8. **Trim Units: 12"x6" Cove Base with round top, Pre-formed Outside and Inside Corners.**
9. **Thinset: Polymer Modified Sanded Thinset Grout**
10. **Grout: Polymer Modified Sanded Grout, Color: To Be Selected**
11. **Installation: Install over slab at flat areas.**
Install over sloped mortar setting bed at recessed slab areas.
12. **Waterproofing and Crack Prevention Membrane: Provide waterproofing / crack isolation membrane at all slab areas. Where applicable, install over tile setting bed, but below thin-set mortar, and extending up wall behind ceramic or porcelain wall base and/or wall tile, where scheduled.**
13. **Waterproofing and Crack Prevention Membrane: Provide waterproofing / crack isolation membrane extending up wall behind ceramic or porcelain wall base and/or wall tile.**
14. **Sealer: Seal Floor Tile and Grout with the Owner's preferred tile and grout sealer, in order to ensure compatibility**.

D. **Glazed Ceramic Wall Tile and Base (typical all areas where scheduled):**
***** To Be Selected By The Owner From One The Following *****

1. **DalTile Porcelain "Chord" - Rectangle/Smooth (No Textured Finish)**
Daltile Porcelain "Haut Monde" - Rectangle/Smooth (No Textured Finish)
Daltile Porcelain "Showscape" - Rectangle/Smooth (No Textured Finish)
2. **Color: As Selected By Owner.**
3. **Module Size: 24"x12", as selected by Owner.**
4. **Surface Finish: Light Polished / Glossy.**
5. **Nominal Thickness: 3/8"**
6. **Grout Joint: As Recommended by Manufacturer**
7. **Thinset: Polymer Modified Sanded Thinset Grout**
8. **Pattern: Staggered / 50% Offset (Refer to Drawings)**
9. **Trim Units: 12"x6" Cove Base with round top**
10. **Grout: Non-Sanded Grout, Color: To Be Selected**
11. **Installation: Install over thin set mortar at cement board wall panels at metal stud walls.**
12. **Waterproofing and Crack Prevention Membrane: Provide waterproofing / crack isolation membrane extending up wall behind ceramic or porcelain wall base and/or wall tile..**
13. **Sealer: Seal Grout Joints with the manufacturer's recommended grout sealer.**

2.2 ACCESSORY MATERIALS

A. **Marble Thresholds (where indicated): Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to ½" or less, and finish bevel to match face of threshold.**

1. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.
    a. Description: Uniform, fine- to medium-grained white stone with gray veining.

2. **Provide 1:50 slope utilizing floor patch below adjacent floor finish at handicapped accessible Restrooms or other door openings with marble thresholds.**

B. **Extruded Aluminum Transition Strip: Provide A.D.A Compliant Extruded Aluminum transition trim in polished chrome finish as required for sloped transitions at the following conditions:**

1. **VCT flooring to Porcelain tile.**
2. **VCT flooring to Quarry Tile.**
3. **VCT to Carpet Tile**

C. Waterproofing and Crack-Suppression Membranes for Thin-Set Floor and Wall Tile Installations: Manufacturer's standard product that complies with ANSI A118.10 and A118.12 and A118.13 and as follows:

1. Liquid Applied Elastomeric Waterproofing Material:

a. Cures to form a monolithic membrane.

b. Able to be spayed for rolled to the specified minimum thickness.

c. Follow manufacturers floor prepration and application recommendations.

d. Suitable for use over 5/16" cement board backing units and gypsum wall board, where applicable.

1) RedGard Waterproofing and Crack Prevention Membrane
2) LevelQuick Waterproofing and Anti-Fracture Membrane.
3) Jamo Inc.; Waterproof.
4) Prior Approved Equal

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Custom Building Products
2. Mapei Corporation
3. Laticrete International Inc.
4. Prior Approved Equal

B. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Pre-packaged dry-mortar mix containing dry additive to which only water must be added.
2. Pre-packaged dry-mortar mix combined with liquid-latex additive.
3. Pre-packaged dry-mortar mix combined with epoxy additive.
4. For wall applications, provide non-sagging mortar.

D. Standard Sanded Cement Grout: ANSI A118.6 for floor tile.

E. Standard Un-sanded Cement Grout: ANSI A118.6, for wall tile.

F. Industrial Grade Epoxy Grout certified for use in Food Service Applications.

G. Stain protecting grout additive: Use in addition to, or in place of, water when preparing grout.

2.4 MISCELLANEOUS MATERIALS

A. Cementitious Backer Unit at Bathroom / Restrooms Floors: ANSI A118.9 in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8”

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials.

C. Grout and Tile Sealer: Provide manufacturer's standard product for sealing grout joints that does not change color or appearance of grout and is compatible with stain protecting additive.

1. **Install two (2) coats of grout and tile sealer, immediately prior to Substantial completion.**

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

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. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Verify pattern with architect prior to installation.

E. Lay out tile wainscots to next full tile beyond dimensions indicated.

F. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.

G. Install cementitious backer units at restroom and bathroom floors and treat joints to comply with ANSI A108.11. Stagger seams.

H. Install “waterproofing and crack suppression membrane” to waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate. Membrane shall extend over the entirety of the floor and up all walls to receive tile and to the full height of the tile product.

1. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

I. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.

1. Tile floors in wet areas.

J. Install tile on floors and walls with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch, or as recommended by manufacturer.
2. Porcelain Mosaic Tile: 1/16 inch, or as recommended by manufacturer.
3. Ceramic Floor and Wall Tile 4”x4”: 1/16 inch, or as recommended by manufacturer.
4. Porcelain Floor and Wall Tile 6”x6”: 1/4 inch, or as recommended by manufacturer.
5. Porcelain Floor and Wall Tile 12”x12”: 1/4 inch, or as recommended by manufacturer.
6. Quarry Floor Tile 6”x6”: 3/8” inch, or as recommended by manufacturer.
7. Quarry Floor Tile 8”x8”: 3/8” inch, or as recommended by manufacturer.

K. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.

1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent non-tile floor finish.

L. Apply grout and tile sealer to cementitious grout joints and tile, at tile floors and walls according to grout-sealer manufacturer's written instructions. As soon as grout ant tile sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

M. Clean tile floors and walls immediately prior to Substantial Completion.

END OF SECTION 093100

SECTION 095120 - ACOUSTICAL TILE CEILING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each acoustical tile, for each concealed suspension system member.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: **Provide full-size units in unbroken/unopened cartons, equal to a minimum of 5.0 percent of total quantity installed, but in no case, less than 4 cases per tile type.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers for Acoustical Ceiling Tile:

1. As listed below.

B. Acceptable Manufacturers for Acoustical Ceiling Grid:

1. As listed below.

2.2 GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

2.3 ACOUSTICAL TILES

A. **Typical Acoustical Tile Ceiling Assembly (ACT-1)**

1. Armstrong – Ultima Fine Texture – Product # 1910
2. CertainTeed – Performa Symphony *m* – Product #1222-IOF-1
3. USG – Mars – Product # 86185
4. Product Specifications:
    1. Size: 24”x24”
    2. Thickness: 5/8”
    3. Edge Detail: Square, Lay-in
    4. NRC: 0.70 (minimum)
    5. CAC: 33 (minimum)
    6. LR: 0.90 (minimum)
5. 15/16” White Painted, Galvanized Snap-Lock Grid

B. **Restroom Acoustical Tile Ceiling Assembly (ACT-2)**

1. Armstrong – Clean Room VL – Product # 868
2. CertainTeed – Performa Vinylrock – Product #1142-CRF-1
3. USG – Sheetrock Lay-In Panels – Product #3260
4. Product Specifications:
    1. Size: 24”x24”
    2. Thickness: 5/8”
    3. Edge Detail: Square, Lay-in
    4. NRC: N/A
    5. CAC: 39 (minimum)
    6. LR: 0.78 (minimum)
    7. 15/16” White Painted, Galvanized Snap-Lock Grid

2.4 SUSPENSION GRID SYSTEM

A. **Grid for ACT-1 and ACT-2**
1. Armstrong 15/16” Prelude XL Exposed Tee System with locking tabs, Galvanized. Color: White
2. CertainTeed, 15/16” ClassicStab Exposed Tee System with locking tabs, Galvanized. Color: White
3. Prior Approved Equal

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
2. Do not attach hangers to steel deck tabs.

D. Install edge moldings and trim at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units. Screw attach moldings to substrate with concealed fasteners at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.

END OF SECTION 095120

SECTION 096510 – VINYL & RUBBER FLOORING PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following, as is applicable to the project:

a. Vinyl Composition Tile (VCT)
b. Luxury Vinyl Tile (LVT)
c. Rubber Tile (RT)
d. Rubber Stair Treads and Risers (RST/RSR)
e. Standard Rubber Base (RB)
f. Transition Strips

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: Units of each color and pattern of resilient floor tile offered.

1.3 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer.

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION TILE

A. Manufacturers and Products: Subject to compliance with requirements, provide products by the following:

1. Vinyl Composition Tile (VCT)

Product: Armstrong Standard Excelon Imperial Texture to match existing *(No Substitutions)*
Size: 12”x12”x1/8” thick
Pattern: Reference Plans for colors and patterns indicated.
Color: Refer to Finish Schedule on Drawings for color selections to match existing building.
To match existing building - NO SUBSTITUTIONS ALLOWED.

2.2 STATIC DISSIPATIVE TILE

B. Manufacturers and Products: Subject to compliance with requirements, provide products by the following:

1. Static Dissipative Tile (SDT)

Product: Armstrong Static Dissipative Tile
Size: 12”x12”x1/8” thick
Pattern: Reference Plans for colors and patterns indicated.
Color: To Be Determined
Provide the manufacturer’s approved Static Dissipative Glue, Static Dissipative Tile Sealer, and Grounding Strips.

2.3 LUXURY VINYL TILE

A. Thermoplastic rubber floor tiles with raised, non-slip texture and square edges.

B. Where scheduled, and subject to compliance with requirements, provide products by the following:

1. Luxury Vinyl Tile (LVT)

Product: Tarkett (Tandus) ID Latitude Series – Latitude Stone
Size: 18”x18”x1/8” thick
Color: #PLST-7242-QU “Hearthstone”
To match existing facility standard - NO SUBSTITUTIONS ALLOWED.

2.3 RUBBER COVE BASE (where scheduled)

A. Thermoplastic rubber wall base with standard cove profile.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Rubber Base (RB)

Product: Roppe Series 700, type "TP" Rubber Base, 4" or 6" High, as scheduled
Color: Refer to Finish Schedule on Drawings for color selections
To match existing building color/pattern. NO SUBSTITUTIONS ALLOWED.

2.4 RUBBER STAIR TREADS AND RISERS

A. A.D.A. Compliant Thermoplastic rubber stair treads with pre-formed nosings, with integral contrasting, non-slip abrasive edge strips, and raised, non-slip texture.

B. Stair Treads shall be provided in sufficient length and width to be field cut and fitted to actual field dimensions.

C. Where scheduled, and subject to compliance with requirements, provide products by the following:

1. A.D.A Compliant Rubber Stair Treads and Risers (RST/RSR)

Product: Roppe Rubber Tread

Size: Refer to Architectural Drawings

Pattern: Profile # To Be Selected with Integral Contrasting, Non-Slip Abrasive Edge Strips

Color: To Be Selected from Manufacturer' Full Range Of Colors.

2.5 FLOORING TRANSITIONS

A. **Provide A.D.A. compliant, polished aluminum transition strips at the following changes in flooring materials:**

A. VCT to LVT – butted joint, centered below door / no transition required.

B. VCT to Sealed Concrete – A.D.A. Compliant Rubber Transition Strip (1/8" x 1-1/2")

C. LVT to Sealed Concrete – A.D.A. Compliant Rubber Transition Strip (1/8" x 1-1/2")

D. VCT tile to porcelain tile - Schluter Schiene, model as is appropriate to the application, or approved equal.

E. VCT tile to ceramic tile - Schluter Schiene, model as is appropriate to the application, or approved equal.

F. VCT to Quarry Tile - Schluter Schiene, model as is appropriate to the application, or approved equal.

G. Other conditions where transitions as may be required - Schluter Schiene, model as is appropriate to the application, or approved equal.

2.6 INSTALLATION MATERIALS

A. Adhesives: Provide and utilize high-moisture /water-resistant type adhesives, as recommended by manufacturer, to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. Level and patch flooring surfaces as required and with appropriate material / substance for professional installation.

3.2 INSTALLATION

A. HVAC units shall be running, and the building shall be climatized, prior to installation of products included in this Section.

B. Allow adequate time for the HVAC system(s) to provide drying of materials within the building, prior to scheduling or performing Calcium Chloride Tests, however, in no case shall Calcium Chloride Tests be performed within 10 days of starting 100% of the HVAC units within the building.

1. **Allow adequate time for the HVAC system(s) to provide drying of materials within the building, prior to scheduling or performing Calcium Chloride Tests, however, in no case shall Calcium Chloride Tests be performed within 10 days of starting 100% of the HVAC units within the building.**

C. Prior to installation of vinyl flooring products, the Contractor / Subcontractor shall perform Moisture Testing of the slab as necessary to determine if/when the slab moisture conditions are suitable for installation of flooring products and adhesives.

D. Upon receipt of acceptable test results above, the Owner shall engage a 3rd Party Construction Materials Testing Agency to perform Calcium Chloride or Relative Humidity Moisture tests, to verify that the moisture in the slab is at or below the manufacturer's recommended limit(s) for installation.

1. **Calcium Chloride or Relative Humidity Moisture Tests shall be performed at a rate of not less than (1) test per 2,000 square feet, however, in no case, shall less than (3) tests be made, per building.**
2. **Notify the Architect and Owner if moisture tests reflect levels higher than recommended by the flooring material manufacturer.**

E. Lay out 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.

F. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

G. Adhere 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.

H. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

I. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

J. Allow materials to reach ambient temperature prior to installation.

K. Verify conditions of substrate are suitable for installation per manufacturer's requirements.

L. Final installation shall be cleaned, waxed and buffed per manufacturer's recommendations, prior to occupancy**.**

M. Verify acceptability of wax and/or sealer manufacturer & product with the Owner, prior to installation.

N. Provide and install (3) coats of wax and/or sealer, as approved by the Owner, immediately prior to Owner's Acceptance of the building.

END OF SECTION 096510

SECTION 099000 – PAINTING & COATINGS

PART 1 – GENERAL

1.00 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1.01 DESCRIPTION OF WORK

A. The extent of painting work is shown on drawings and schedules, and as herein specified.

B. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

C. The work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated.

D. “Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime intermediate or finish coats.

E. Paint exposed surfaces whether or not colors are designated in "schedules", except where natural finish of material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Architect will select these from standard colors available for materials systems specified.

F. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as *(but not limited to)* metal toilet enclosures, refinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, elevator entrance frames, doors and equipment.

G. Concealed Surfaces: Unless otherwise indicated, such as back priming of all exterior wood trim, painting is not required on surfaces such as walls or ceiling in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.

H. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

I. Operating Parts and Labels: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated. Do not paint over any code-required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature panels.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

B. Samples: Submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. On 12"x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved.

1.03 DELIVERY AND STORAGE

Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer’s name and label, and following information:

A. Name or title of material, Federal Specification number (if applicable), application instructions, manufacturer's color name and number.

1.06 QUALITY ASSURANCE

A. Mock-Up Samples: Provide a full-coat benchmark finish sample for each type of coating and substrate required, to include primer coat and top coats, similar to those specified later in this Section.

1. Exterior Wall Surfaces: **Allow for up to 4 samples of approximately 10 SF to include siding, and trim selections.**
2. Exterior Ceilings and Soffits: **None required.**
3. Interior Wall Surfaces: **Allow for up to 4 samples of approximately 100 SF to include wall, and trim selections.**
4. Millwork, Small Areas and Items: **Allow for up to 4 additional miscellaneous colors to be located at various miscellaneous areas and items. Architect will designate items or areas required.**

B. Final approval of colors will be selected from Mock-Up samples.

C. Approved Mock-Up samples may be incorporated into the finished work.

1.05 JOB CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between *50 degrees F (10 degrees C.)* And *90 Degrees F (32 degrees C.)* Unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between *45 degrees F (7 degrees C.)* And *95 degrees F (35 degrees C.),* unless otherwise permitted by paint manufacturer's printed instruction.

C. DO NOT APPLY PAINT in snow, rain, fog or mist; or when relative humidity exceeds *85%* or damp or wet surfaces, or as recommended by the manufacturer for the specific product being applied, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are closed, heated, and within temperature and humidity limits specified by the paint manufacturer during the duration of application and drying periods.

D. Paint Coordination: Provide finish coats which are compatible with primer paints used. Review other sections of these specification in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

1.06 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with manufacturer's labels describing contents. Deliver extra materials to Owner.

1. Quantity: 5 percent, but not less than 1 gal. (3.8 L), as appropriate, of each material and color applied.

2. Deliver and store the extra stock in the attic of each residence. Provide to the Architect documentation signed by the Contractor's Project Superintendent, indicating receipt and delivery of the extra materials, as directed.

PART 2 - PRODUCTS

2.01 MATERIAL QUALITY

A. Provide best quality grade of various types of coating as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

2. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

3. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

B. Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

C. Coordination: Ensure that the manufacturer guarantees the materials proposed for finish coats are compatible with proposed primer(s).

D. **Refer to the "Schedule of Paint Systems" provided at the end of this section.**

PART 3 - EXECUTION

3.01 INSPECTION

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work.

B. **Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator's acceptance of surfaces and conditions within any particular area. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film, or over C.M.U. walls that have not been completely filled, to eliminate open voids and pin holes.**

3.02 SURFACE PREPARATION

A. General:

1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified for each particular substrate condition. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary for complete painting of painting of each space

or area, reinstall removed items. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning.

2. Ensure that debris from cleaning and preparation processes will not fall onto wet, newly-painted surfaces.

3. **Surface preparation shall include scraping, sanding, and other cleaning (via by hand, power-tool, or chemical cleaning processes), as required to prepare the surface for application in strict accordance with the requirements of the manufacturer to ensure that the manufacturer's Warranties will not be compromised.**

4. **The Painting Subcontractor shall perform destructive testing of the existing painted surfaces prior to Bidding, as necessary to accurately determine and address any areas where adhesion issues may exist, and to adequately include addressing the same as part of the Contractor's Bid Proposal.**

B. Cementitious Materials:

1. Prepare Cementitious surfaces of concrete, concrete block, cement plaster and cement board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils and by roughening as required to remove glaze. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

2. Clean concrete floor surfaces scheduled to be painted with commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.

C. Wood Materials:

1. Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of while shellac or other recommended knot sealer, before application of priming coat.

   After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

2. Prime, stain or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces-undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
3. When transparent finish is required, use spar varnish for back-priming.
4. Back-prime paneling on interior partitions only where masonry plaster, or other wet wall construction occurs on backside.
5. Seal tops, bottoms, and cut-outs of un-primed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

D. Galvanized Surfaces:

1. Clean free of oil and surface contamination with non-petroleum based solvent.

3.03 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

1. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
2. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film if necessary, and strain material before using.

3.04 APPLICATION

A. General:

1. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
2. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
4. Paint interior surfaces of ducts, where visible through registers or grilles, with flat, non-specular black paint.
5. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
6. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
7. Sand lightly between each succeeding enamel or varnish coat.
8. Omit first coat *(primer)* on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
9. **Apply C.M.U. Block Filler in two coats. After installation and drying, inspect and apply additional Block Filler at any locations required to completely fill all voids in particularly porous blocks. Finish coats of paint shall not be installed until all voids and pin holes have been filled in the C.M.U. substrate.**

B. Scheduling Painting:

1. Apply first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
3. **DO NOT APPLY FINAL COAT(S) OF PAINT TO ANY SURFACE UNTIL PERMANENT LIGHTING IS TURNED ON, SURFACES HAVE BEEN THOROUGHLY AND CAREFULLY INSPECTED, AND ANY REMEDIAL WORK HAS BEEN COMPLETED.**

C. Minimum Coating Thickness:

1. Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

D. Prime Coats:

1. Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.

2. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Block Filler:

1. Apply first coat generously, and back-roll thoroughly, with the intent of filling all voids in the surface of the CMU or brick.

2. Upon drying, thoroughly and carefully inspect all surfaces for thin areas, voids, pinholes, or other surface defects which will require patching, filling, caulking, and/or re-coating.

3. Where individual CMU blocks vary noticeably in porosity or surface texture, spot apply additional coats of block filler, as required to approximate the surface texture (smoothness) of the adjacent blocks.

4. Recoat as required to provide a smooth, uniform surface for application of top coats, prior to installation of finish coats.

F. Pigmented (Opaque) Finishes:

1. Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, color spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

F. Transparent (Clear) Finishes:

1. Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs brush marks, orange peel, nail holes, or other surface imperfections.

G. Completed Work:

1. Match approved samples for color, texture, and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.05 FIELD QUALITY CONTROL

A. The right is reserved by the Owner to invoke material testing procedures at any time, and at any frequency during the period of field painting.

3.06 CLEAN-UP AND PROTECTION

A. Clean-Up:

1. During progress of work remove from site discarded paint materials, rubbish, cans and rags at end of each work day.
2. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping using care not to scratch or otherwise damage finished surfaces.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing or work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
2. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
3. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 MANUFACTURERS

A. Provide Painting products by one of the following manufacturers:

1. The Sherwin-Williams Company (Basis Of Design)
2. Benjamin-Moore & Co.
3. PPG Pittsburg Paints

B. Provide all Interior and Exterior paint materials from a single manufacturer.

C. Products by The Sherwin-Williams Co. are listed only for the purpose of establishing a Basis of Design and minimum level of quality.

D. Approval of products by alternate manufacturers: Equivalent products manufactured by the alternate manufacturers listed will be considered if: (1) submitted in accordance with the requirements of the Contract Documents, and (2) accompanied by a line item specification comparison, to verify that the products submitted by the alternate manufacturer are equal or superior to those listed to establish the Basis of Design and minimum level of quality.

3.08 EXTERIOR PAINTING SCHEDULE

A. General: Provide paint systems for the various substrates, as indicated below:

Ferrous/Galvanized Metal/Aluminum – Metal Doors, Frames, Bollards, Lintels, & Miscellaneous Metal Fabrications (Semi-Gloss Finish)

Basis of Design:

Base Coat: Sherwin-Williams: B66W01310 - Pro Industrial Pro-Cryl® Universal Acrylic Primer

Note: Apply additional coats of primer, if necessary to achieve complete coverage of metal substrate, sanding in-between if necessary, as required to provide a smooth, uniform, and level surface for application of finish coats.

1st Top Coat: Sherwin-Williams: B66W01151- Pro Industrial DTM Acrylic (Semi-Gloss)

2nd Top Coat: Sherwin-Williams: B66W01151- Pro Industrial DTM Acrylic (Semi-Gloss)

3.09 INTERIOR PAINTING SCHEDULE

A. General: Provide paint systems for the various substrates, as indicated below:

Interior Gypsum Drywall Walls (Satin Finish)

Basis of Design:

Base Coat(s): Sherwin-Williams: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer

Note: Apply additional coats of primer, if necessary to achieve complete coverage of gypsum drywall, and to cover existing painted finishes, sanding in-between if necessary, as required to provide a smooth, uniform, and level surface for application of finish coats.

1st Top Coat: Sherwin-Williams: B20W02651 - ProMar® 200 Zero VOC Interior Latex (Satin)

2nd Top Coat: Sherwin-Williams: B20W02651 - ProMar® 200 Zero VOC Interior Latex (Satin)

Gypsum Drywall Ceilings (Satin Finish)

Base Coat(s): Sherwin-Williams: B28W02600 - ProMar® 200 Zero VOC Interior Latex Primer

Note: Apply additional coats of primer, if necessary to achieve complete coverage of gypsum drywall, sanding in-between if necessary, as required to provide a smooth, uniform, and level surface for application of finish coats.

1st Top Coat: Sherwin-Williams: K46W01151 – Pro Ind. Pre-Cat. Water Based Epoxy (Satin)

2nd Top Coat: Sherwin-Williams: K46W01151 – Pro Ind. Pre-Cat. Water Based Epoxy (Satin)

Interior Wood with Opaque Finish (Semi-Gloss Finish)

Basis of Design:

Base Coat(s): Sherwin-Williams: B51W00620 - PrepRite® ProBlock® Int/Ext Latex Primer/Sealer

Note: Apply additional coats of primer, if necessary to achieve complete coverage of wood, sanding in-between if necessary, as required to provide a smooth, uniform, and level surface for application of finish coats.

1st Top Coat: Sherwin-Williams: A76W00051 - SOLO Interior/Exterior 100% Acrylic (Semi-Gloss)

2nd Top Coat: Sherwin-Williams: A76W00051 - SOLO Interior/Exterior 100% Acrylic (Semi-Gloss)

Interior Metals - Frames, Doors, Exposed Struct. Steel, & Misc. Steel Items (Semi-Gloss Finish)
Basis of Design:
Base Coat(s): Sherwin-Williams: B66W01310 - Pro Industrial Pro-Cryl® Universal Acrylic Primer
Note: Apply additional coats of primer, if necessary to achieve complete coverage of metal substrate, sanding in-between if necessary, as required to provide a smooth, uniform, and level surface for application of finish coats.
1st Top Coat: Sherwin-Williams: B66W01151- Pro Industrial DTM Acrylic (Semi-Gloss)
2nd Top Coat: Sherwin-Williams: B66W01151- Pro Industrial DTM Acrylic (Semi-Gloss)

3.09 INTERIOR TRANSPARENT WOOD FINISH (STAIN) SCHEDULE

A. Not Applicable.

END OF SECTION 099000

SECTION 100101 – FIREMAN'S KEY BOX

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install the following items:

1. Fireman's Key Box (Rapid Access System)

1.2 RELATED SECTIONS

A. Section 042000 - Unit Masonry

B. Section 055000 – Metal Fabrications: Metal bracing, fasteners and other support components

C. Section 061000 - Rough Carpentry: Wood blocking

D. Section 092116 - Gypsum Board Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and other data as required to verify compliance with the specified requirements.

B. Manufacturer's installation instructions.

C. Manufacturer's operation and maintenance data, as is applicable.

D. Samples: Color charts showing manufacturer's full range of colors.

1.4 COORDINATION

A. Coordinate installation of Fireman's Key Boxes with the work of other trades.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Design Standards are based on named products and manufacturers. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the Design Standards and comply with Division 1 requirements regarding substitutions to be considered.

B. Knox Company – as Required by the City Of Lake Charles, Louisiana, Fire Dept.

C. Substitutions – NOT ALLOWED.

2.2 PRODUCTS

A. Fireman's Lock Box (Rapid Access System)

1. **Knox Company, 1601 W. Deer Valley Road, Phoenix AZ 85027 1-800-704-0889 / Knoxbox.com**
2. **Model Number: KnoxVault 4400.**
3. **Standard Features: Hinged and gasketed door.**
4. **Mounting: Surface Mount without perimeter flange.**
5. **Locking Arrangement: Single lock.**
6. **Keying: Lake Charles Fire Department, Lake Charles, LA**
7. **Tamper Switch: Not Required**
8. **Colors: ~~Black,~~ Aluminum, ~~Bronze~~ (To Be Selected)**

9. **Quantity Required: 1 each - Reference location(s) on drawings.**

PART 3 - EXECUTION

3.1 LOCAL JURISDICTION APPROVAL

A. Contact Knox Company for paperwork required for order.
B. Contact Lake Charles Fire Department – Fire Chief for Approval and Signature, required prior to order.

3.2 EXAMINATION

A. Verify all related work has been completed, preparatory work has been installed, required blocking and supports have been installed, and locations are ready for installation.

B. Verify mounting height requirements with Lake Charles Fire Department, prior to installation.

C. Where Fireman's Key Boxes are to be installed in walls with masonry or other decorative veneers, coordinate required blocking thickness with Key Box dimensions, to ensure that the finished material finishes immediately behind the perimeter flange.

3.2 INSTALLATION

A. Anchor Fireman's Key Box to substrate or blocking with (4) 3/8" Grade 5 or Grade 8 lag screws or thru-bolts with washers, installed through mounting holes provided in the back of the Fireman's Key Box.

B. Caulk, grout, or mortar joint between the wall finish and flange, as required, to result in a finished installation.

3.3 CLEANING AND ADJUSTING

A. Make final adjustments after installation.

B. Clean items of dirt and foreign matter which may affect appearance and operation.

END OF SECTION 100101

SECTION 101100 – VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Markerboards
2. Tackboards
3. Trim, including Marker Trays and Map Rails
4. Accessories
5. Mounting

1.2 SUBMITTALS

A. For each type of product indicated, provide the following:

1. Shop Drawings, including drawings and schedules.
2. Product Data
3. Physical Color Samples
4. Warranty Information

PART 2 - PRODUCTS

2.1 MARKERBOARDS

A. Porcelain Enamel Steel on 7/16" (minimum) MDF, with 0.015 aluminum backing. Porcelain steel shall be cold-rolled, specially processed for temperatures used in coating porcelain on steel. Coat exposed faces and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Fuse cover and ground coats to steel at manufacturer's standard firing ranges.

B. Color: Standard White

2.2 TACKBOARDS

A. **Integrally-colored cork on 3/8" fiberboard**. Cork shall be self-healing, and shall conform to MS MIL-C-15116C. Flame Spread shall be 25 or less, and Smoke Developed shall be 10 or less, when tested in accordance with ASTM E-84.

B. Color Options: Provide selection from manufacturer's full-range of integrally-colored cork, but no less than ten (10) colors.

C. Color Selection: To Be Determined by Architect and Owner.

2.3 TRIM

A. 5/8" or 3/4" wide, 6063-T5 Alloy Aluminum with satin anodized finish. Finish shall comply with NAAMM and shall be Class II Clear Anodized Finish (Mechanical Finish: as fabricated, non-specular; Chemical Finish: etched, medium matte; Anodic Finish: Class II Architectural, film thickness 0.4 mil (minimum).

2.4 MARKER TRAY

A. Provide ADA compliant flat marker tray, with plastic endcaps.

B. Where marker trays occur at combination markerboard & tackboard units, tray length shall match the full length of assembled combination markerboard/tackboard units.

C. Marker tray shall not be required at tackboard units without attached markerboards.

2.5 MAPRAIL

A. Provide continuous 2" maprail with 1/4" integrally colored cork insert, and endcaps.

B. Provide Map Rail at all markerboards, tackboards, and combination markerboard/tackboard units.

2.6 ACCESSORIES

A. Provide (1) flag holder per classroom. Provide (1) combination map hook / tension clamp for each foot of visual display board length.

2.7 VISUAL DISPLAY BOARD SCHEDULE

A. Refer to Drawings for Types, Sizes, Locations, and Quantities of Visual Display Boards required.

2.8 MOUNTING

A. Manufacturer's standard mounting, utilizing concealed L-clips or brackets anchored to wall, and spaced at 16" O.C. maximum, top and bottom (sides if

recommended by manufacturer), with manufacturer's recommended adhesive applied to the at back of markerboard and tackboard panels at 12" O.C. each way (minimum).

B. Provide and install plywood furring with finished exposed faces at perimeter (to paint), where indicated on drawings, or otherwise required to allow installation of visual display boards across exposed building structure, conduits, or other raceways.

C. Coordinate Visual Display Board installation height with Owner, prior to installation.

NOTE: In no case shall Marker Boards be installed with the top of the marker tray higher than 2'-9 1/2" (33-1/2") above finished floor, to ensure A.D.A. compliance.

END OF SECTION 101100

SECTION 101400 – SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following, as may be applicable to this project:

1. Building Plaque
2. Exterior Building Signs, Letters, and Logos
3. Exterior Room and Exit Signs
4. Interior Room and Exit Signs
5. Traffic and Parking Signs

1.2 SUBMITTALS

A. For each type of product indicated, provide the following:

1. Product Data
2. Installation Instructions, including ADA compliance.
3. Warranty Information

PART 2 - PRODUCTS

2.1 BUILDING PLAQUE

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. A.R.K Ramos Signage Systems
2. Metallic Arts
3. Metal Arts

B. Basis-of-Design Product: The design for the Building Plaque is based on products provided by A.R.K. Ramos.

1. Alternate items shall be similar in appearance, design, and quality, in order to be approved as “equal”.

2. Requests for substitutions shall be submitted for approval <u>prior</u> to Bid, in accordance with the requirements in the Instructions To Bidders.

3. Building Plaque Schedule

    a. **ONE (1) CAST ALUMINUM PLAQUE WILL BE REQUIRED FOR THIS PROJECT.**

4. Plaque Specifications

    a. Material: **Virgin Aluminum**
    b. Size: **24”W. x 36”H.**
    c. Mounting: Style to be selected from Manufacturer’s Standard options.
    d. Border: Style to be selected from Manufacturer’s Standard options.
    e. Background Texture: Style to be selected from Manufacturer’s Standard options.
    f. Finish: Style to be selected from Manufacturer’s Standard options.
    g. Type Style: Style to be selected from Manufacturer’s Standard options.
    h. Layout: See attached Sample Layout

5. **Contractor shall install the Building Plaque at a location to be determined by the Owner and/or Architect.**

6. **Refer to Sample Building Plaque Layout following this Section.**

2.2 BUILDING SIGNS, LETTERS, AND LOGOS

A. Basis-of-Design: **Dimensional Aluminum Letters**

B. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. A.R.K. Ramos Signage Systems
2. Metallic Arts
3. Metal Arts
4. Gemini Sign Systems

C. The design for Exterior Building Numbers, Letters, and Logos is based on products indicated on the Drawings.

1. Alternate items must be similar in appearance, design, and quality, in order to be approved as “equal”.
2. Requests for substitutions shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.

D. **Refer to the Drawings for Locations, Sizes, Types, and Wording for Building Numbers, Letters, and Logos.**

2.3 EXTERIOR ROOM AND EXIT SIGNS

A. Manufacturers: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Best Sign Systems
2. ASI Sign Systems
3. Mohawk Sign Systems

B. The design for Interior Room and Exit Signage is based on products indicated on the Signage Schedule(s) included in the Drawings.

1. Alternate items shall be similar in appearance, design, and quality, in order to be approved as "equal".
2. Requests for substitutions shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.

C. **Refer to the Drawings for Signage Schedule and Interior Room and Exit Signage locations.**

2.4 INTERIOR ROOM AND EXIT SIGNS

A. Basis-of-Design: **Engraved Plastic Signs**

B. Manufacturers & Products: Subject to compliance with requirements of the Contract Documents, Drawings, and Specifications, provide products by one of the following:

1. Best Sign Systems
2. ASI Sign Systems
3. Mohawk Sign Systems

C. The design for Interior Room and Exit Signage is based on products indicated on the Signage Schedule(s) included in the Drawings.

1. Alternate items shall be similar in appearance, design, and quality, in order to be approved as "equal".
2. Requests for substitutions shall be submitted for approval prior to Bid, in accordance with the requirements in the Instructions To Bidders.

D. **Refer to the Drawings for Signage Schedule and Interior Room and Exit Signage types, sizes, and locations.**

2.5 INSTALLATION

A. Install items according to manufacturers' written instructions, using fasteners appropriate for the substrate indicated, and as recommended by the manufacturer.

B. Install units level, plumb, and firmly anchored in locations and at heights indicated.

C. Comply with the Americans With Disabilities Act, 2010 ADA Standards.

1. Refer to the Drawings and Manufacturer's recommendations for installation.
2. In the event of a discrepancy between the Drawings and Manufacturer's recommendation, contact the Architect for clarification prior to installation of items or blocking within walls.

D. **Coordinate and install solid 2x blocking at all specialty item locations, prior to installation of wall finishes.**

PART 3 - CLOSEOUT

3.1 Closeout Documentation

A. For each type of product indicated, provide the following documentation at closeout:

1. Product Data
2. Installation Instructions, including ADA compliance
3. Warranty Information

END OF SECTION 101400

HURRICANE LAURA REPAIRS AND RECONSTRUCTION OF THE ARTS & HUMANITIES BUILDING

2021

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2'-0"

3'-0"

SECTION 102613 – CORNER GUARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Furnish and install the following:

1. 2-Piece Rigid Vinyl + Aluminum Corner Guards
2. 1-Piece Stainless Steel Corner Guards

1.2 RELATED SECTIONS

A. Section 042000 - Unit Masonry

B. Section 055000 – Metal Fabrications: Metal bracing, fasteners and other support components

C. Section 061000 - Rough Carpentry: Wood blocking

D. Section 092116 - Gypsum Board Assemblies

1.3 SUBMITTALS

A. Product Data:

1. Manufacturer’s specifications and other data as necessary to verify compliance with the specified requirements.
2. Manufacturer’s installation instructions.
3. Manufacturer's operation and maintenance data, as is applicable.
4. Details indicating corner guard size, length, and attachment, specific to the project installation.

B. Samples: Color charts showing manufacturer's full range of colors.

1.4 PRE-INSTALLATION CONFERENCE

A. Refer to Section 013113 – Project Coordination

1.5 COORDINATION

A. Coordinate Work of this Section with work of other sections in which items are to be installed.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Design Standards are based on named products and manufacturers. Other manufacturers must have a minimum of five (5) years experience in manufacturing products meeting or exceeding the Design Standards, and shall comply with Division 1 requirements regarding substitutions to be considered.

B. Construction Specialties / CS Group

C. Inpro Corporation / IPC

2.2 MATERIALS

A. Rigid Vinyl Corner Guards with Aluminum Retainer

1. Material: Rigid Vinyl with Continuous Aluminum Retainer Bracket and Rigid Vinyl Top and Bottom Caps
2. Finish: Manufacturer's standard, uniform pebble textured finish, to be selected from the Manufacturer's Full Range of available colors and finishes.
3. Size: 2" x 2" x 6'-0"
4. Color: To be selected from the Manufacturer's Full Range of available colors and finishes.
5. Attachment: Concealed, factory punched and countersunk holes, uniformly spaced, not to exceed 12" on center.
6. Fasteners: Utilize fasteners of type, size, and length as required by wall construction, finish thickness, and blocking/framing type.
7. Construction: Reference drawings for details.
8. Count: Reference drawings for locations

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify utility (electrical, water, and gas) locations, where applicable, do not conflict with installation.

B. Verify items fastened to walls have proper blocking or support items installed.

C. Verify locations indicated for installation of items are ready for installation.

3.2 INSTALLATION

A. Install all items in accordance with manufacturer's printed instructions in locations shown on drawings.

B. Install projection screen housing in conjunction with installation of ceiling system. After interior construction is essentially complete, install viewing surface and operating mechanism in housing. Install screens securely to supporting substrate so that screens are level and back of case is plumb. Provide required brackets, hanger rods, and fasteners.

3.3 CLEANING AND ADJUSTING

A. Make final adjustment after installation and clean all backstop support piping of dirt and other substances which may affect final finish.

B. Clean all items of dirt and foreign matter which may affect appearance and operation.

END OF SECTION 102613

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Toilet Accessories, Shower Accessories, and Janitorial Room accessories.

1.2 RELATED SECTIONS

A. Section 042000 – Unit Masonry.

B. Section 054000 – Cold-Formed Gage Metal Framing

C. Section 092116 - Gypsum Wallboard Systems

D. Section 09 3013 - Ceramic Tiling

E. Section 102113 – Solid Phenolic Toilet Partitions

F. Division 26 - Electrical

1.3 SUBMITTALS

A. Product Data

1. Manufacturer’s specifications and technical data.
2. Manufacturer’s product drawings and details.
3. Manufacturer’s installation instructions.
4. Manufacturer’s operation and maintenance instructions.
5. Manufacturer’s warranty data.

B. Shop drawings: Indicate size, material and finish. Show locations, installation procedures. Include details of joints, attachments, fasteners, clearances, and mounting heights.

1.4 MINIMUM COMPLIANCE STANDARDS

A. Comply with ANSI A117.1 and with referenced standards specified with each product or material.

1.5 QUALITY STANDARDS

A. Design, finish and keying of items shall be the same.

B. Furnish items from one (1) manufacturer only unless otherwise specified or directed by Architect.

1.6 PRE-INSTALLATION CONFERENCE

A. Refer to Section 013113 – Project Coordination.

1.7 COORDINATION

A. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.8 WARRANTY

A. Warrant the work specified herein for three (3) years, or provide manufacturer's standard warranty for specified products, against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.

B. Defects shall include, but not be limited to:

1. Delamination or deterioration of finish
2. Noisy, rough or difficult operation
3. Failure to meet specified quality assurance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceeds the Design Standards are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the Design Standards and comply with Division 1 requirements regarding substitutions to be considered.

1. A & J Washroom Accessories
2. American Specialties, Inc. (ASI)
3. Bobrick Washroom Equipment, Inc
4. Bradley Corp.
5. Koala Bear Kare (Diaper Changing Station)

B. Design Standards are based on products of Bobrick Washroom Equipment, Inc., (281)362-7515

2.2 COMPONENTS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Stainless Steel:

1. Stainless Steel Sheet: ASTM A666 Type 302 or 304.
2. Stainless Steel Tubing: ASTM A269, stainless steel.
3. Finish: No. 4 satin, unless otherwise specified
4. Thickness: 22 US Stainless gauge minimum

C. Chromium Plating:

1. Method: Over nickel
2. Standard: ASTM C456, Type SC 2

D. Mirrors (Framed):

1. Standard: FS DD-G-451-C, silvering quality No. 1 float or plate
2. Thickness: 1/4 inch
3. Backing: Electrolytic cooper
4. Protection: Padding and filler strips

E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.

F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

G. Backing: concealed backing to comply with local codes and as required for substrate conditions; or manufacturers standard mounting kits.

2.3 FINISHING

A. Stainless Steel: No. 4 satin brushed, typical on all accessories, unless otherwise noted.

B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats vitreous enamel.

C. Chrome/Nickel Plating: satin finish.

D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 - EXECUTION

3.1 MOUNTING LOCATIONS

A. Comply with ADA requirements. Refer to drawings. When not shown, submit supplier's recommendations for locations and mounting height before proceeding.

B. General Contractor shall be responsible for supplying all opening, blocking, and other components necessary for installation of all toilet accessories.

C. Use approved theft-resistant type fasteners.

3.2 SCHEDULE

A. **REFER TO TOILET ACCESSORY SCHEDULE(S) ON DRAWINGS**

END OF SECTION 102800

SECTION 105200 - FIRE PROTECTION SPECIALTIES

SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers.
2. Cabinets and brackets for mounting fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Fire Extinguishers: Include rating and classification.

1.3 QUALITY ASSURANCE

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.

PART 2 - PRODUCTS

2.1 PORTABLE FIRE EXTINGUISHERS

A. General: Provide fire extinguishers of type, size, and capacity for each location indicated. Reference schedule.

1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated, with monoammonium phosphate-based dry chemical in enameled-steel container.

1.	**Size:**	**10 pound**
2.	**Type:**	**ABC**
3.	**Mounting:**	**Appropriately sized Cabinet with Bracket.**
4.	**Locations:**	**Refer to Drawings and Fire Extinguisher Schedule for types and locations.**
5.	**Rated Cabinets:**	**Provide and install Rated Fire Extinguisher Cabinets at rated walls, and as indicated and/or scheduled on Drawings.**

~~C. Wet Chemical Type: UL-rated, specifically designed for grease fire hazards with potassium acetate based low-PH agent.~~

~~1. Size: **2.5 gallon**~~
~~2. Type: **K**~~
~~3. Mounting: **Appropriately sized Cabinet with Bracket.**~~
~~4. Locations: **Refer to Drawings and Fire Extinguisher Schedule for types and locations at rooms with Residential Range or Cooktop.**~~

2.2 FIRE-EXTINGUISHER CABINETS

A. Manufacturers:

1. JL Industries, Inc.
2. Larsen's Manufacturing Company.

B. Cabinet Construction: **Semi-Recessed or Surface Mounted, Rated or Non-Rated, as indicated on Drawings and as listed in the Fire Extinguisher Schedule.**

C. Cabinet Material: **Aluminum sheet, welded, burnished, and finished.**

D. Semi-Recessed Cabinet: Cabinet box partially recessed in walls of depth as appropriate to suit style of trim indicated; recessed and exposed dimensions will vary, based on wall type, cabinet type (non-rated or rated), and cabinet style. Cabinet shall be finished on (5) sides, where exposed to view; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: Return depth as required by application, location, and wall thickness.

E. Surface-Mounted Cabinet: Cabinet box surface mounted on walls of shallow depth not allowing semi-recessed cabinet installation. Cabinet shall be finished on (5) sides, where exposed to view; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: Return depth as required by application, location, and wall thickness.

F. **Door Style: Fully glazed panel with frame**.

G. **Door Glazing: Molded acrylic bubble, clear**.

H. Door Hardware: Manufacturer's standard operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

I. Accessories:
1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

a. Identify fire extinguisher in fire-protection cabinet with the words

"**FIRE EXTINGUISHER**".

1) Location: Applied to cabinet glazing.
2) Orientation: Vertical.
3) Color: Red or White, as selected by the Architect.

J. Finishes:

1. Manufacturer's standard baked-enamel paint or metal finish as specified for the following cabinet locations:

a. Exterior of cabinet.
b. Interior of cabinet.

2.3 QUANTITY

1. **Locations, quantity, and types, as indicated on the Drawings and Fire Extinguisher Schedule.**

2.4 INSPECTION AND CERTIFICATION

A. Fire Extinguishers are to be inspected, certified, and tagged accordingly, by a Louisiana Licensed Inspection agency prior to Substantial Completion. Inspection tags shall be dated no more than 7 days prior to the date of Substantial Completion.

2.5 CLOSEOUT DOCUMENTATION

A. Provide closeout documentation as indicated below:

1. Provide copies of the Manufacturer's Operation and Maintenance documentation for Fire Extinguishers incorporated into the Project.

2. Provide copies of the Manufacturer's Warranty information for Fire Extinguishers incorporated into the project.

END OF SECTION 105200

SECTION 107300 – ALUMINUM WALKWAY COVERS & DOOR CANOPIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Design, fabrication, and installation of welded extruded aluminum walkway cover and door canopy systems.

B. Products Furnished but not Installed Under this Section: embedded column sleeves, styrofoam blockouts, and/or anchor bolts, as is applicable.

1.2 REFERENCES

A. The Aluminum Association (AA):

1. The Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

C. American Society of Civil Engineers (ASCE):

1. ASCE 7, Minimum Design Loads for Buildings and Other Structures.

D. American Society for Testing and Materials (ASTM):

1. ASTM B 209, Specification for Aluminum and Aluminum- Alloy Sheet and Plate.
2. ASTM B 221, Specification for Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. ASTM C 150, Specification for Portland Cement.
4. ASTM C 404, Specification for Aggregates for Masonry Grout.

E. American Welding Society (AWS):

1. ANSI/AWS D1.2, Structural Welding Code - Aluminum.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design Walkways in accordance with The Aluminum Design Manual 2000.
2. Comply with the wind requirements of **IBC 2021 and ASCE 7-16**.
3. Provide an all-welded extruded aluminum system, complete with internal drainage. Non-welded systems are not acceptable.
4. Provide expansion joints to accommodate temperature changes of 120 degrees F. Provide expansion joints with no metal-to-metal contact.

B. Performance Requirements:

1. Grout: Grout, where required shall have Compressive Strength of 3,000 psi, minimum.

1.4 DELEGATED DESIGN SUBMITTAL

A. **Canopy system design and calculations shall be performed and prepared by the Canopy Manufacturer, based on empirical test data, applicable codes and standards, and project specific requirements.**

B. **Design and Structural analysis data and calculations shall be prepared, signed and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

C. **Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

D. **Design/Code Requirements: Roofing system shall be designed in accordance with the requirements of the following Codes, Standards, and other criteria:**

1. **IBC-2021**
2. **ASCE-7-16 – Design Requirements for Components & Cladding, and wind uplift requirements for based on the project's specific geographical location and topographical characteristics.**
3. **Risk Category: "III"**
4. **Exposure Category: "C"**
5. **Design Wind Speed: 145 MPH, 3-second gust wind speed**

1.5 SUBMITTALS

A. Product Data: Manufacturer's product information, specifications, and installation instructions for walkway cover components and accessories.

B. Shop Drawings: Include plan with dimensions, elevations, and details.

1. **Drawings shall be prepared, signed and sealed by a Registered Professional Engineer, licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

C. Design Data: Design calculations bearing the seal of a Registered Professional Engineer, duly licensed, and in current good standing, in the State of Louisiana.

1. Design calculations shall state that the walkway cover system design complies with the wind requirements of **IBC 2021 and ASCE 7-16, and as design criteria specified herein**, the stability criteria of applicable building code, and all other governing criteria.

2. **Design and Structural analysis data and calculations shall be prepared, signed and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific design loads and governing code requirements as described herein and as indicated on the drawings.**

D. Samples: Provide color and material samples, as indicated:

1. Selection: Provide the Manufacturer's Color Selector indicating the full range of standard and premium colors

2. Verification: Provide physical samples, 3”x6” size, of actual color coatings for each color and/or finish(es) selected, on the specified substrate.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least ten years experience in the design, fabrication, and erection of extruded aluminum walkway cover systems.

B. Installer Qualifications: Have walkway covers installed by manufacturer, third party installation is not acceptable.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide Aluminum Walkway Canopies by one of the following manufacturers:

1. **Peachtree Protective Covers, Inc., Lithia Springs, GA.**
2. **Avadek, Inc., Webster, TX.**
3. **Dittmer Architectural Aluminum, Winter Springs, FL.**
4. Comparable products of other manufacturers will be considered approved, only if submitted prior to the Bid, and reviewed, approved, and listed as approved by Manufacturer Name and Product in a formally issued Addendum.

2.2 MATERIALS

A. Aluminum Members: Extruded aluminum, ASTM B 221, 6063 alloy, T6 temper.

B. Fasteners: Aluminum, 18-8 stainless steel, or 300 series stainless steel.

C. Protective Coating for Aluminum Columns Embedded in Concrete: Clear acrylic.

D. Grout:

1. Portland Cement: ASTM C 150, Type I.
2. Sand: ASTM C 404.
3. Water: Potable
4. Minimum Design Strength: 3,000 psi, or as required by the stamped engineering criteria.

E. Gaskets: Dry seal santoprene pressure type.

F. Aluminum Flashing: ASTM B 209, Type 3003 H14, 0.040 inch, minimum.

2.3 FABRICATION

A. General:

1. Shop Assembly: Assemble components in shop to greatest extent possible to minimize field assembly.

2. Welding: In accordance with ANSI/AWS D1.2.

3. Bent Construction: Factory assemble beams to columns to form one-piece rigid bents. Where used make welds smooth and uniform using an inert gas shielded arc. Perform suitable edge preparation to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints can be used if supported by engineering calculations and/or testing.

4. Deck Construction: Fabricate from extruded modules that interlock in a self-flashing manner. Positively fasten interlocking joints creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Assemble deck with sufficient camber to offset dead load deflection.

B. Columns: Provide square-cornered or round tubular extrusions as indicated on drawings, factory welded to beam and/or cross members. Where indicated on drawings, columns shall function as integral downspouts, with shop installed cutout at beam/column connection, and shall have internal diverter for drainage where indicated.

1. Provide mouse-hole shaped downspout openings with internal diverter flashing where outlets are indicated to be exposed above grade.
Note: Circular downspout openings in columns are not acceptable.

2. Provide pipe outlet extensions of standard pipe diameter, and of length(s) indicated on drawings where outlets are indicated to be concealed below grade, and connect to sub-surface drainage (by others).

3. Fully grout interior of columns at integral downspout locations, to prevent holding water.

C. Gutter Beams: Provide open-top tubular extrusion, with top edges thickened for strength and designed to receive deck members in self-flashing manner.

D. Cross Members: Provide cross members of square-cornered tubular or open-top tubular extrusions where indicated on drawings, or otherwise required for canopy height transitions.

E. Deck: Extruded self-flashing sections shall be interlocking, to form a composite unit. Provide welded plate closures at deck ends and terminations.

1. Deck profile shall be 4" minimum thickness, or deeper, if required by the Aluminum Walkway Cover Manufacturer to meet the required design wind loads.

F. Fascia: If not indicated, provide Manufacturer's standard profile. Otherwise provide fascia profile(s) as indicated on drawings.

1. Provide fascia splices where continuous runs of fascia are jointed. Locate splices to be in line with bents and fasten in place on hidden or non-vertical surfaces.

G. Arches: For barrel vault protective covers, provide square-cornered tubular extrusions.

H. Factory Finishing: Finish designations prefixed by AA comply with system established by the AAMA for designating aluminum finishes.

~~1. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.4 mils to 0.7 mils thick),complying with AAMA 611. (Equivalent ALCOA Number: 204 R1).~~

~~2. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matted, Anodic Coating: Architectural Class I, clear coating 0.7 mils or thicker),complying with AAMA 611. (Equivalent ALCOA Number: 215 R1).~~

~~3. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color~~

~~coating 0.7 mils or thicker), complying with AAMA 611. (Equivalent ALCOA Number: 215 R1).~~

~~3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system, except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss), complying with AAMA 2603. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting.~~

4. High performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

a. Fluoropolymer Two-Coat Coating System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

~~b. Fluoropolymer Three-Coat Coating System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.~~

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.2 ERECTION

A. Erect protective cover true to line, level, and plumb. Protect aluminum columns embedded in concrete with clear acrylic. Fill downspout columns with grout to the discharge level to prevent standing water. Install weep holes at top of concrete in non-draining columns to remove condensation.

B. Provide hairline miters and fitted joints.

C. Grout recessed baseplates flush and level with adjacent paving elevation. Protect aluminum canopy components and adjacent surfaces from grout. Remove any grout from adjacent surfaces immediately.

3.3 CLEANING

A. Clean all protective cover components promptly after installation.

3.4 PROTECTION

A. Protect materials during and after installation.

END OF SECTION 107300

SECTION 131250 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural framing, metal wall panels, metal roof panels, metal liner panels, flashing, awnings, gutters, downspouts, roof ventilators, thermal insulation and accessories.

B. See Division 3 Section "Cast-in-Place Concrete" for concrete foundations, slabs, and anchor-bolt installation.

C. See Division 8 Section for “Overhead Coiling Doors” and “Hollow Metal Doors and Frames”, if applicable.

1.2 **DELEGATED DESIGN SUBMITTAL**

A. **Metal Building system design and calculations shall be performed and prepared by the Roofing Manufacturer, based on empirical test data, applicable codes and standards, and project specific requirements.**

B. Design and Structural analysis data and calculations shall be prepared, signed, and sealed by a Registered Professional Engineer, duly licensed in the State of Louisiana, who is responsible for their preparation, to certify conformance with project specific requirements, design loads, and governing code requirements as described herein and as indicated on the drawings.

C. Design/Code Requirements: Metal Building Systems shall be designed in accordance with the requirements of the following Codes, Standards, and other criteria:

1. International Building Code (IBC), 2021 Edition
2. ASCE 7-16, including wind uplift requirements for “Components & Cladding”, based on the project’s specific geographical location and zone
3. Risk Category: “III”
4. Exposure Category: “C”
5. 145 MPH, 3-second gust wind speed

D. Engineering Calculations: Engineering calculations defining cladding loads on all roof areas based on specified building codes, allowable clip loads, and required number of fasteners to secure the panel clips to the designated substructure.

1. Calculate wind uplift requirements for the following roof zone conditions:

Zone 1 - Field
Zone 2 - Perimeter
Zone 3 - Corner
Zone 4 - Perimeter / Overhang
Zone 5 - Corner / Overhang

2. Calculate uplift loads on clip fasteners with full recognition of prying forces and eccentric clip loading. Calculate holding strength of fasteners in accordance with submitted test data provided by fastener manufacturer based on length of embedment and properties of materials.

A. Product Data: Submit product data for each type of metal building system component indicated in Section 1.1, or otherwise required.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. **For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional civil engineer, duly licensed in the State of Louisiana, responsible for their preparation.**
2. Anchor-Bolt Plans: Submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location. **Note: In addition to the column centerline and the face of steel / building lines, the Anchor Bolt layout drawings shall indicate the edge of slab/foundation, dimensioned to the face of steel / building line at all conditions around the perimeter of the building.**
3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details.

Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

5. Accessory Drawings: Include details of items including but not limited to flashing, gutters, downspouts, roof ventilators, louvers, head, jamb and sill conditions at doors, fans, etc. All details shall be at a legible scale.

C. Color Selection Chart: For units with factory applied color finish.

D. Letter of Design Certification: Provide a letter, signed and sealed by a qualified professional civil engineer licensed in the State of Louisiana, stating the applicable codes, and compliance with the same.

E. Welding certificates.

F. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.

G. Manufacturer certificate: Indicating AISC Certification for Metal Buildings.

H. Maintenance Data: For metal panel finishes.

I. Field Quality Control Reports.

J. Warranties: As listed below:

1.	Manufacturer's Standard Material and Workmanship Warranty	**Required**
2.	Manufacturer's Standard Panel Finish Warranty	**Required**
3.	20-year weathertightness warranty.	**Not Required**
4.	Special Warranties	**Not Required**

5. **Refer to Front End Documents for additional Roof Warranties, including Weathertightness Warranties, that may be required by the Owner. These Warranties, if required as a part of this specification section, are a requirement of this project, and are NOT negotiable or modifiable, and must be accepted by the metal building manufacturer prior to submitting a pricing proposal for this project. By submitting a pricing proposal to the Contractor, the metal building manufacturer indicates his acceptance of any additional Roof and/or Weathertightness Warranties required, without exception, or clarification.**

1.3 QUALITY ASSURANCE

A. Erector Qualifications: An experienced erector with a minimum of five (5) years experience, who has specialized in erecting and installing metal buildings similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

The Metal Building Erector shall be certified, duly authorized, and in good standing with the metal building manufacturer at the time of installation of the metal building, wall, and roofing systems specified for the project.

If Weathertightness Warranties and/or additional Roof Warranties are specified and/or required by this Specification or elsewhere in the Front End Documents, an "Approved Applicator" letter shall be included with the metal building submittals, indicating that the Erector or roof installer is authorized to install the specified roof systems, as required for issuance of the warranties.

B. Manufacturer Qualifications: A qualified manufacturer and member of the MBMA

1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional civil engineer licensed in the State of Louisiana.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

D. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses. "AISC 360"

E. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.

F. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

G. Source Limitations: Obtain metal building system components, including primary, secondary framing and metal panel assemblies from single source and from single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage. Unload, store and erect panels in a manner to prevent bending, warping, twisting and surface damage. Damaged panels shall be discarded and replaced. Protect insulation at all times. Damaged insulation shall be discarded and replaced.

1.5 PROJECT CONDITIONS

A. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements.

B. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels.

1.6 COORDINATION

A. Coordinate anchor-bolt installation with and into concrete foundation to ensure that actual anchorage dimensions correspond to established dimensions on plans.

B. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions on plans.

C. Coordinate metal panel assemblies with gutters, downspouts, flashing, trim, awnings and supports in order to provide a leak proof, secure, and noncorrosive application.

D. Coordinate secondary framing with all building penetrations, including doors, coiling doors, fans, louvers, etc., allowing for proper rough openings and positive attachment of wall panels on all sides.

E. Coordinate rough openings with primary and secondary structural members for adequate clearance.

F. **Coordinate interface of, and loading associated with, Precast Concrete Wall panels, attaching to, and supported by the Metal Building Structure.**

G. **Coordinate interface of conventional structural steel framing, attaching to the Metal Building Structure.**

H. **Coordinate requirements of the Cementitious Composite Tectum Wall Panels and Ceiling Panels (if applicable), specified elsewhere.**

I. **Coordinate requirements of the Metal Roof Decking and Poly-Iso Insulation Systems (if applicable), specified elsewhere.**

J. **Coordinate requirements for metal stud framing, sheathing, and cladding, (if applicable), specified elsewhere.**

1.7 WARRANTY

A. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal building components due to failure related to materials or fabrication.

B. Special Warranty on Metal 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.

1. Exposed Panel Finish Warranty shall include the following:

a. Color fading more than 15 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 2 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. **Warranty period – 20 years from date of substantial completion.**

C. Special Weathertightness Warranty for Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that leak or otherwise fail to remain weathertight.

1. **Not Required – Roof Panels by others, as specified in Section 074113 "Pre-Finished, Pre-Formed Metal Roofing".**

PART 2 - PRODUCTS

2.1 METAL BUILDING MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alliance Steel, Inc.
2. American Buildings Company.
3. American Steel Building Company, Inc.; Division of NCI Building Systems, LLP.
4. Butler Manufacturing Company.
5. Ceco Building Systems; Division of Robertson-Ceco Corporation.
6. Gulf States Manufacturers, Inc.
7. Mesco Metal Buildings; Division of NCI Building Systems, LLP.
8. Metallic Metal Building Company; Division of NCI Building Systems, LLP.
9. Pinnacle Structures, Inc.
10. Star Building Systems; Division of Robertson-Ceco Corporation.
11. Steelox Systems Inc.
12. United Structures of America, Inc.
13. VP Buildings, Inc.; a Division of BlueScope Buildings North America, Inc.

2.2 METAL BUILDING SYSTEM PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified Professional Civil Engineer duly licensed in the State of Louisiana, using performance requirements and design criteria indicated per plans, specifications and applicable codes.

B. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity, wind, and wind uplift loads and stresses within limits and under conditions indicated:

1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."

2. Design Loads: As required by **International Building Code (IBC) 2021 Edition** and **ASCE 7-16**.

   Risk Category: **III (per IBC 2021, Section & Table 1604.5)**
   Wind Rating: **145 m.p.h.**
   Exposure Category: **C**
   Live Load: **20 p.s.f.**
   Collateral Load: **20 p.s.f.**
   Special Loading: **Building shall support Precast Concrete Wall Panels**

3. Seismic Performance: As required by **ASCE 7-16**.
4. Wind Uplift Resistance: Provide metal roof panel assemblies that comply with UL-580 for Class-90 and ASTM E-1592
5. Drift Limits: **Lateral drift at a maximum of L/480 of the building height.**
6. Deflection Limits: Design metal building system to withstand design loads with deflections no greater than the following:

    a. Primary Framing Assemblies: **Horizontal deflection of 1/480 of the span.**
    b. Bar Joist Purlins: **Vertical Deflection of 1/600 of the span**
    c. Purlins and Rafters: **Vertical deflection of 1/360 of the span.**
    d. Girts: **Horizontal deflection of 1/480 of the span.**
    e. Spandrel Beam Girts Supporting Masonry Veneer: **Horiz. deflection of 1/600 of the span.**
    f. Metal Roof Panels: **Vertical deflection of 1/360 of the span.**
    g. Metal Wall Panels: **Horizontal deflection of 1/360 of the span.**
    h. Secondary Framing System: **As required to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.**
    i. **Lintels and beams with shelf supporting masonry veneer: Vertical deflection of L/600, not exceed 0.25" at mid span.**

C. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss with a temperature change range of 150 deg. F ambient material surfaces.

D. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test pressure difference of 6.24 lbf/sq.ft.

E. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a wind load design pressure of not less than 6.24 lbf/sq.ft.

2.3 METAL BUILDING SYSTEM REQUIREMENTS

A. Description: Provide a complete integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

B. Primary Frame Type: **Rigid Frame and/or Continuous Beam, 3-plate built-up sections with or without interior columns, as indicated on plans, with prime coat ~~or hot-dipped galvanized~~ finish, as indicated on the Drawings.**

C. End Wall Framing: **Continuous Beam, 3-plate built-up columns and beam sections, with 8" x 16" HSS tube intermediate columns, as indicated on plans, with prime coat ~~or hot-dipped galvanized~~ finish. The use of cold formed, gauge-framed endwalls are not approved.**

1. **Engineer North wall to be <u>non-expandable</u>, supporting half-bay design loads.**
2. **Engineer South wall to be <u>non-expandable</u>, supporting half-bay design loads.**

D. Secondary Framing, Roof: **Manufacturers standard "Z"-shaped purlins, 10" minimum depth, or deeper, if required to meet design loads, with mill-galvanized finish.**

E. Secondary Framing, High Eave Strut: **Manufacturer's standard offset "C"-shaped vertical-leg eave strut, 10" depth, minimum, or deeper, if required to match roof secondary framing depth, with mill-galvanized finish.**

F. Secondary Framing, High Eave Strut: **Manufacturer's standard offset "C"-shaped vertical-leg eave strut, 10" depth, minimum, or deeper, if required to match roof secondary framing depth, with mill-galvanized finish.**

Provide custom-fabricated low eave extension at top of precast wall panels, to allow for fastening of standing seam metal roof clip fasteners at the low eave. Refer to Section Details in Drawings for required profile and dimensions.

G. Structural Spandrel Beam Framing, Walls: **Standard hot-rolled HSS tube sections, 12" or 16" wide x 8" high, for support of Precast Concrete Wall Panels, as required to meet design loads, partially outset and coped and welded to primary frame columns and HSS endwall columns to result in a continuous beam exposed at the interior side, with primed finish. unless indicated otherwise.**

A. Secondary Framing, Walls: **Manufacturer's standard "Z"-shaped girts, 8" minimum depth, or as required to meet design loads, fully outset (by-pass), unless indicated otherwise, with mill-galvanized finish.**

B. Building Dimensions:

1. **Building Addition: 71'-2" Wide (Out-to-Out Steel Framing) x 53'-1" Long (Out-to-Out Steel Framing @ West Side) / 52'-1" Long (Out-to-Out Steel Framing @ East Side).**

C. Low Eave Height:

1. **Building Addition: Single Slope Roof, As indicated on drawings**

D. Bay Spacing:

1. **Building Additon: As indicated on drawings**

E. Roof Slope:

1. **Building Addition: Single Slope Roof**
1 inches of rise per 12 inches of run (1:12).

F. Roof System: **As indicated on Drawings.**

A. **Gym Building: 22 gauge Standing Seam Panel Roof system, as specified in Specification Section 074100 "Prefinished, Preformed, Metal Roofing", Simple Saver (or equal) full-thickness roof insulation system to match metal building purlins height.**

G. Exterior Wall System: **As indicated on Drawings.**

A. **Open sidewalls and endwalls, for Precast Concrete Wall Panels, metal stud framing, and aluminum curtainwall, by others.**

B. **The Metal Building Manufacturer shall provide exterior spandrel beam framing and interior beam framing where indicated for attachment and support of the Precast Concrete Wall Panels, miscellaneous structural framing, metal stud framing, and aluminum curtainwall, by others. Refer to drawing for locations, sizes, and quantity.**

H. Interior Wall Liner System: **None Required**

2.4 SPECIAL CONSIDERATIONS

A. **This project involves a primary Metal Building structure, with attached and integrated conventional structural steel components and framing techniques, commonly referred to as a "Hybrid" structure. As such, additional engineering, coordination, verification, and communication will be required. In submitting the Bid Proposal for this project, the Contractor, the Metal Building Manufacturer, and the Steel Erector do thereby indicate and certify that they have contemplated, and are fully cognizant of the same, and have made the necessary and appropriate considerations to execute the project, accordingly.**

B. **Engineer, provide, and install all structural steel framing components included within the perimeter of the metal buildings. The Metal Building Package shall include all HSS struts at eaves for attachment of Precast Concrete Wall Panels, stud wall infill framing, HSS framing for support and bracing of exterior curtainwall systems, and HSS framing for support and bracing of metal stud framed walls, as part of the metal building system. <u>These components shall not be excluded from the Metal Building package</u>. Where structural components included as part of the Metal Building Package are sized, these sizes shall be considered as the minimum allowable for the locations indicated. All HSS-to-HSS connections shall be fully welded. Where exposed to view, grind, bondo, and prep as required to result in an architectural appearance.**

C. **The conventional structural steel framing systems at the adjacent building areas and canopies shall be provided and installed by the Structural Steel Supplier.**

D. **The Contractor shall be responsible for the coordination between the Metal Building Manufacturer/Supplier and the Structural Steel Fabricator vendors, as required to ensure that the Metal Building and Conventional Structural Steel Framing connect to and interface with one another.**

E. **The metal building shall be designed to accept the connection of the conventional structural steel framing, as well as the associated reactions and loadings resulting from these connections, and shall be designed to provide bracing for these structures.**

2.5 STRUCTURAL FRAMING

A. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; spandrel beams, and wind bracing.

Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing as indicated.

All interior primary framing components (3-plate fabricated members, hot-rolled members, and miscellaneous fabricated items) shall be prime-coated after fabrication, unless specifically noted to be hot-dipped galvanized.

All exterior / exposed primary framing components (3-plate fabricated members, hot-rolled members, and miscellaneous fabricated items), where indicated, shall be seal-welded and hot-dipped galvanized after fabrication.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field bolted assembly. Provide frame span and spacing indicated.

2. Rigid Clear-Span Frames: **I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.**

3. Continuous Beam Frames: **I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are permitted, only where specifically indicated on the Drawings.**

4. Post & Beam Endwall Frames: **I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel (W- or HSS-) shapes, as indicated. Intermediate columns are permitted, only where specifically indicated on the Drawings.**

5. Frame Configuration: **Single slope.**

6. Exterior Column Type: **Tapered, 3-plate, I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates**.

7. Rafter Type: **Tapered, 3-plate, I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates**.

8. Interior Intermediate Column Type(s): **Within the Metal Building portion of the building(s), provide HSS 6”x6” columns, at the locations indicated, to be concealed within 6” metal-stud framed walls. Column wall thicknesses shall be verified and sized by the Metal Building Manufacturer, however, the wall thicknesses (if) indicated shall be the minimum allowed.**

9. End-Wall Framing: **Cold-rolled framing members shall NOT be utilized for endwall framing columns or rafters.**

10. End-Wall Corner Columns: **Tapered, 3-plate, I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates**.

11. End-Wall Rafters: **Tapered, 3-plate, I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates.**

12. End-Wall Intermediate Columns: **Hollow tube sections, HSS-shapes, as indicated on drawings, extending to parapet height, for support of metal stud infill framing and brick masonry veneer, by others.**

13. **Canopy Beams: Canopy Beam Type: Tapered 3-plate I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes, W-shapes, or HSS-shapes, as indicated on drawings, <u>fully seal-welded, where exterior to the main building envelope.</u>**

14. **All primary framing components interior to the main building envelope shall be prime coated, after fabrication.**

15. **All primary framing components exterior to the main building envelope shall be hot-dipped galvanized, after fabrication.**

B. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet pre-painted with coil coating, unless otherwise indicated.

All secondary framing components and cold rolled members shall be mill galvanized material.

1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch wide flanges.

   a. Depth: Purlins will have a depth of **10"**, or as indicated on drawings, or as required to meet design requirements.

   b. Spacing: Purlin spacing at the roof will be as follows:

      1. Edge Zones (8’-0” wide, minimum): **2'-0" on-center (maximum), or closer, as determined by engineering analysis.**
      2. Field: **4'-0" on-center (maximum), or closer, as determined by engineering analysis.**

2. Bar Joists: Manufactured bar joists, consisting of top and bottom chords fabricated from back-to-back structural angle sections, and diagonal chords fabricated from bar stock or angle.

3. **Bar Joist sizing indicated shall be verified by the Metal Building Manufacturer's engineering data, however, the indicated bar joist size(s) shall be the minimum allowed.**

4. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch wide flanges.

    a. Depth: **8".**

5. Eave Struts: Unequal-flange, vertical-leg, C-shaped sections; fabricated from minimum 0.1046-inch thick steel sheet, built-up steel plates, or structural-steel shapes; as required to provide adequate backup for metal panels.

    a. Depth: **Match Purlin Depth**

6. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
7. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
8. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch (zinc-coated (galvanized) steel sheet.
9. Purlin and Girt Clips: Minimum 0..25-inch thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
10. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch thick.
11. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
12. Miscellaneous Light Gauge Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
13. **Hot-Rolled Structural Members: Hot-rolled structural steel shapes as indicated on the drawings. Provide members shop primed where concealed, and hot-dipped galvanized where exposed to the exterior, or otherwise indicated.**

C. Bracing: Provide adjustable wind bracing as follows:

1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
3. Rigid Portal Frames: Fabricate from shop-welded, 3-plate built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
4. Modified Portal / Bracing Frames: combination of traditional portal frame and diagonal, K-, or X-bracing, in combinations appropriate for the required loadings. Fabricate from shop-welded, 3-plate built-up steel plates and/or structural-steel shapes; sized as required to withstand design loads.
5. Bracing: **Provide wind bracing using the methods specified above, at locations as indicated on the drawings.**
    a. **Where bracing locations are not specifically indicated, and a conflict would occur between traditional X-bracing and openings indicated on the Architectural Drawings, provide Portal Frame or Portal Brace framing.**

D. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted. Provide hot-dipped galvanized bolts for structural-framing components that are galvanized.

All bolts shall be hot dipped galvanized.

2.6 STRUCTURAL-FRAMING MATERIALS

A. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.

B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.

C. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55 .

D. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.

F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 , or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.

G. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G60 coating designation; mill phosphatized.

H. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating.

I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C

J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: **Hot-dip zinc coating, ASTM A 153/A 153M, Class C.**

K. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: **Hot-dip zinc coating, ASTM A 153/A 153M, Class C.**

L. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM A 36/A 36M carbon steel.
3. Finish: **Manufacturer's standard prime-coated.**

2.7 THERMAL INSULATION

A. Board Insulation for Modified Bitumen Membrane Roofing System:

1. **Refer to drawings for insulation types, thicknesses, and conditions.**

B. Metal Building Roof Insulation:

1. **Full Thickness Simple Saver (or approved equal) roof insulation system, as indicated on drawings.**

C. Metal Building Exterior Wall Insulation:

1. **Refer to drawings for insulation types, thicknesses, and conditions.**

2.8 METAL ROOF PANELS

A. **Refer to Specification Section 074113 "Prefinished, Preformed Metal Roof Systems"**

2.9 METAL WALL PANELS

A. **Refer to Specification Section 076115 "Prefinished, Preformed Metal Wall Siding and Soffits"**

2.10 METAL FLASHING AND TRIM

A. **Refer to Specification Section 076220 "Sheet Metal Flashing and Trim for Metal Roofs and Walls"**

2.11 ACCESSORIES

A. **Refer to Specification Sections listed in Parts 2.7, 2.8, 2.9, and 2.10 above.**

2.12 QUALITY CONTROL

A. Contractor: The Contractor is responsible for testing and inspection of all connections, and shall prepare a written report, certifying that all connections have been tightened in accordance with the manufacturer's requirements.

1. **All connections shall be initialed by the erector installing and tightening the bolts, to indicate that all bolts at the given connection have been properly torque-tightened.**
2. **Any connections requiring re-inspection by the Testing Agency will be at the cost of the Contractor.**

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.

1. **Anchor Bolt torque testing.**
2. **Bolted Connection torque testing.**
3. **Re-inspection of bolted connections, if required, will be at the cost of the Contractor.**

C. Special Inspector: Owner may engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special Inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.

D. Tests and Inspections:

1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1.

PART 3 - EXECUTION

3.1 ERECTION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

B. Erect metal building system plumb and level, in accordance with the manufacturer's written erection instructions and erection drawings.

C. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer. Copies of all such documentation shall be provided to the Architect for review and file purposes.

D. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

E. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so that no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

F. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure.

G. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and snug-tightened or pre-tensioned joints.

H. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.

1. Provide rake or gable purlins with tight-fitting closure channels and fascia.
2. Locate and space wall girts to suit openings such as doors and windows.

3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 METAL PANEL INSTALLATION, GENERAL

A. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
2. Install metal panels perpendicular to structural supports, unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
5. Lap metal flashing over metal panels to allow moisture to run over and off the material.

B. Lap-Seam Metal Panels: Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact

surface, or by other permanent separation as recommended by metal roof panel manufacturer.

D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.

1. **Provide rope sealant or non-skinning butyl sealant at all lap or splice conditions in panels and trims. Do not use polyurethane sealants at these locations.**

3.3 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations. Install ridge and hip caps as metal roof panel work proceeds.

B. Field-Assembled, Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, factory-provided motorized seaming tool, such that clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Rigidly fasten end of metal roof panels and allow free movement due to thermal expansion and contraction. Pre-drill panels for fasteners.
5. Provide metal closures at peaks, rake edges, rake walls and each side of ridge and hip caps.

3.4 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. When two rows of metal panels are required, lap panels 4 inches minimum.
2. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.

3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
4. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
5. Install screw fasteners in predrilled holes.
6. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
7. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws.
8. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Field-Assembled, Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

3.5 INSULATION INSTALLATION

A. General: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions.

1. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder.
4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder.

B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by metal roof panels fastened to secondary framing.
2. Thermal Spacer Blocks: Where metal roof panels attach to purlins, install thermal spacer blocks.
3. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

4. Poultry Wire: Install poultry wire over and between purlins / girts with adequate drape to allow insulation to expand to the full thickness specified.

C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by metal wall panels fastened to secondary framing.

1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Poultry Wire: Install poultry wire over and between purlins / girts with adequate drape to allow insulation to expand to the full thickness specified.

3.6 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. 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 will be permanently watertight and weather resistant.

1. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.

C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

E. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.

F. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

G. Roof Ventilators: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.

B. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports.

C. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. **All connections shall be initialed by the erector installing and tightening the bolts, to indicate that all bolts at the given connection have been properly torque-tightened.**
3. **Any connections requiring re-inspection by the Testing Agency will be at the cost of the Contractor.**
4. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1.

D. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following tests and inspections and to submit reports.

1. **Anchor Bolt torque testing.**
2. **Bolted Connection torque testing.**
3. **Welded Connection visual inspection.**
4. **Any connections requiring re-inspection by the Testing Agency will be at the cost of the Contractor.**

3.8 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 13125

SECTION 22 00 00 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) and Division 0 as appropriate, apply to the Work specified in this Section.

B. Refer to all Sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding all work.

1.2 SCOPE OF WORK

A. Furnish all labor and material necessary to provide and install the complete plumbing portion of this Contract as called for herein and on accompanying drawings. Parts of the plumbing division may be bid separately or in combination, at the Contractor's option; however, it shall be the responsibility of the General Contractor to assure himself that all items covered in the Plumbing Division have been included if he chooses to accept separate bids.

B. It is the intent of this specification that all materials with temperatures below ambient conditions or conveying any fluid/gas at temperatures below 70 deg. F be insulated to completely eliminate the potential for condensation. Unless specified elsewhere in these specifications, for materials that do not require access, insulate with 2" thick 3/4# density fiberglass duct wrap insulation with foil face (seal all joints air and water tight). For materials requiring occasional access, use 2" thick closed cell rubberized insulation with re-sealable fabric joints (hook and loop type).

C. Contractor shall refer to the Architectural and Structural drawings and install equipment, piping, etc. to meet building and space requirements. No equipment shall be bid on or submitted for approval if it will not fit in the space provided.

D. It is the intention of these specifications that all plumbing systems shall be furnished complete with all necessary valves, controls, insulation, piping devices, equipment, etc. necessary to provide a satisfactory installation that is complete and in good working order.

E. Contractor shall visit the site and acquaint himself thoroughly with all existing facilities and conditions which would affect his portion of the work. Failure to do so shall not relieve the Contractor from the responsibility of installing his work to meet the conditions.

F. This Contractor shall protect the entire system and all parts thereof from injury throughout the project and up to acceptance of the work. Failure to do so shall be sufficient cause for the Architect to reject any piece of equipment.

1.3 GROUNDS AND CHASES

A. This Contractor shall see that all required chases, grounds, holes and accessories necessary for the installation of his work are properly built in as the work progresses; otherwise, he shall bear the cost of providing them.

1.4 FILL AND CHARGES FOR EQUIPMENT

A. Fill and charge with materials or chemicals all those devices or equipment as required to comply with the manufacturer's guarantee or as required for proper operation of the equipment.

1.5 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work , of all trades and sub-contractors bidding this project. It is the prime bidders responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation, that require provision of services by another sub-contractor or trade.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with Division 0 & 01 requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with Division 0 & 01 requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bids, in accordance in Division 0 & 01 requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with Division 0 & 01 requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all Division 0 & 01 requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor (whose proposal is also being accepted).
2. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question, or seeking clarification.
3. The work has been accepted as the responsibility of the prime contractor directly.

1.6 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents includes all items necessary for the proper execution and completion of the Work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgement of the Architect expressed in writing is equal to that specified.

C. All plumbing fixture shall be provided and installed by Contractor as scheduled and specified.

D. Coordinate and properly relate all Work of this Division to building structure and work of all other trades.

E. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with Division 0.

F. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information from physically examining the existing equipment, receiving specific cut sheet information from the Owner’s representative, other trades and/or Architect. Rough-in services for “NIC” equipment as required, as the work progresses.

G. Provide storage and protection for all equipment and materials in accordance with requirements of Division 0 & 01. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to Owner.

H. Keep premises clean in accordance with requirements of Division 0 & 01.

1.7 SUBSTITUTIONS

A. Substitutions are only allowed by approval of the Architect prior to Bid Date as stipulated in Division 0 and/or Division 0 & 01.

B. Design of systems is based on specific equipment. If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by manufacturer of substituted equipment. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, their equipment with different model numbers shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from Contract Document requirements. Furnish all options specified or reasonably implied from the contract documents. Specifically identify any variance is regard to submittal versus specified performance on the cover sheet of each submittal.

1.8 VALUE ENGINEERING (V/E):

A. While it may be in the project Owner’s interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, Division 22 contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance) with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

B. Should contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, Division 22 contractor shall provide duly licensed professional engineering consultants working on behalf of the Division 22 contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for performance and suitability of V/E hybrid systems, materials or operational changes related to respective V/E items. The Division 22 contractor's licensed professional engineering consultants and the Division 22 contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as Division 22 contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

C. Division 22 contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the Division 22 contractor's (V/E Items) professional of record (either employees, or independent consultants to the Division 22 contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the Division 22 systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and their original use of Engineering Seals used for original Contract Documents, shall not apply.

1.9 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items Should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

1.10 CODES AND REGULATIONS

A. Work shall be in full accord with the most stringent interpretation of the Louisiana State Plumbing Code 2013, local ordinances, building codes, and other applicable national, local, and state regulations.

B. Equipment shall conform to requirements and recommendations of the National bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1

D. In the possible event of conflict between codes or regulations and Contract Documents, the most stringent interpretation of either shall govern (provided if exceeds the requirements of other codes. In the event of an irreconcilable difference between codes or regulations notify the Architect/Engineer immediately.

E. In addition to the codes heretofore mentioned, all mechanical work and equipment shall conform to the applicable portions of the following specifications, codes and/or regulations:

1. National Electrical Code (NEC)
2. National Fire Protection Association (NFPA)
3. American Society of Mechanical Engineers (ASME)
4. American Gas Association(AGA)
5. Underwriters Laboratories (UL)
6. International Building Code (IBC)

F. All materials, equipment and accessories installed under this Contract shall conform to all rules, codes, etc. as recommended by National Associations governing the manufacturer, rating and testing of such materials, equipment and accessories. All materials shall be new and of the best quality and first class in every respect. Whenever directed by the Architect, the Contractor shall submit a sample for approval before proceeding.

G. Where laws or local regulations provide that certain accessories such as gauges, thermometers, relief valves and parts be installed on equipment, it shall be understood that such equipment be furnished complete with the necessary accessories, whether or not called for in these Specifications.

H. All unfired and fired pressure vessels shall be built in accordance with the A.S.M.E. Code and so stamped. Furnish shop certificates for each vessel. Contractor shall provide and pay for first operating certificate as per State Fire Marshal Regulations.

1.11 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees.

B. Pay any and taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

C. All permits, fees, certificates, etc. for the installation, inspections, plan review, service connections locations, and/or construction of the work which are required by any authority and/or agencies having jurisdiction, shall be obtained and paid for by the Contractor.

D. The Contractor shall make all tests required by the Architect, Engineer or other governing authorities at no additional cost to the Owner.

E. The Contractor shall notify the Architect and local governing authorities before any tests are made, and the tests are not to be drawn off a line covered or insulated until examined and approved by the authorities. In event defects are found, these shall be corrected and the work shall be retested.

F. Prior to requesting final inspection by the Architect, the Contractor shall have a complete coordination and adjustment meeting of all of his sub-contractors directly responsible for the operation of any portion of the system. At the time of this meeting, each and every sequence of operation shall be checked to assure proper operation. Notify the Architect in writing ten (10) days prior to this meeting, instructing him of the time, date and whom you are requesting to be present.

G. This project shall not be accepted until the above provisions are met to the satisfaction of the Architect.

1.12 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.13 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of Division 0/and or Division 0 & 01.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where approved manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document requirements, specifically call such deviations to attention of Architect on submittals. Type deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

1.14 REVIEW OF MATERIALS:

A. Whenever manufacturers or trade names are mentioned in these Plans or Specifications, the words "or approved equivalent" shall be assumed to follow whether or not so stated. Manufacturers or trade names are used to establish a standard of quality only, and should not be construed to infer a preference. Equivalent products which meet the Architect's approval will be accepted; however, these products must be submitted to the Architect a minimum of ten (10) days prior to the Bid Date.

B. Submission shall include the manufacturer's name, model number, rating table and construction features.

C. Upon receipt and checking of this submittal, the Architect will issue an addendum listing items which are approved as equivalent to those specified. THE CONTRACTOR SHALL BASE HIS BID SOLELY ON THOSE ITEMS SPECIFIED OR INCLUDED IN THE "PRIOR APPROVAL ADDENDUM", AS NO OTHER ITEM WILL BE ACCEPTABLE.

D. Prior approval of a particular piece of equipment does not mean automatic final acceptance and will not relieve the Contractor of the responsibility of assuring himself that this equipment is in complete accord with the Plans and Specifications and that it will fit into the space provided. Shop drawings must be submitted on all items of equipment for approval as hereinafter specified.

E. Before proceeding with work and/or within thirty (30) days after the award of the General Contract for this work, the Mechanical Contractor shall furnish to the Architect complete shop and working drawings of such apparatus, equipment, controls, insulation, etc. to be provided in this project. These drawings shall give dimensions, weights, mounting data, performance curves and other pertinent information.

F. The Architect's approval of shop drawings shall not relieve the Contractor from the responsibility of incorrectly figured dimensions or any other errors which may be contained in these drawings.

Any omission from the shop drawings or specifications, even through approved by the Architect, shall not relieve the Contractor from furnishing and erecting same.

G. Seven (7) sets of shop drawings shall be submitted to the Architect for approval. These submittals shall be supplied as part of this Contractor's contract. Any drawings not approved shall be resubmitted until they are approved. SUBMIT ALL SHOP DRAWINGS AT THE SAME TIME. NO SEPARATE ITEMS WILL BE ACCEPTED.

H. Submit one (1) sepia with two (2) blueline prints of all mechanical room layouts showing locations of all equipment, piping, etc. to insure all will fit in space provided. Submit drawings at 1/4" scale.

1.15 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with requirements of Division 0 & 01.

B. During construction period, keep accurate records of installations made under this Division, paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

C. The Contractor shall obtain at his cost, two sets of blueline prints of the original bid documents by the Architect. One set shall be kept on the site with all information as referenced below, and shall update same as the work progresses. The other set will be utilized to record all field changes to a permanent record copy for the Owner.

D. If the Contractor elects to vary from the Contract Documents and secures prior approval from the Architect for any phase of the work, he shall record in a neat and readable manner, **ALL** such variances on the blueline print in red. The original bluelines shall be returned to the Architect for documentation.

E. All deviations from sizes, locations, and from all other features of the installations shown in the Contract Documents shall be recorded.

F. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions and the like, as well as other features of the work which will be concealed underground and/or in the finished building.

G. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc., and by properly referenced centerline or invert elevations and rates of fall.

H. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. The Architect's/Engineer's decision in this matter will be final.

I. The following requirements apply to all "As-Built" drawings:

1. They shall be maintained at the Contractor's expense.
2. All such drawings shall be done carefully and neatly, and in a form approved by the Architect/Engineer.
3. Additional drawings shall be provided as necessary for clarifications.
4. These drawings shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Architect/Engineer; and when necessary, to establish clearances for other parts of the work.
5. "As-built" drawings shall be returned to the Architect upon completion of the work and are subject to approval of the Architect/Engineer.

1.16 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of Division 2, Site Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid and tested. Give Owner' Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative inspection and as subsequently found to be deficient, the trenches shall be uncovered, inspected, and then re-filled, if requested by Owner's Representative.

C. Provide minimum 18 inches of cover or in compliance with local published frost line data (if greater than 18 inches) to finish grades or paving at water piping.

D. For piping, provide bell holes at trench bottom to assure uniform bearing. Accurately grade trench bottoms by instrument before laying any pipe.

E. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers.

F. Compact fill.

1.17 CUTTING AND PATCHING

A. Comply with requirements of Division 0 and Division 0 & 01 regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Repairing Roadways and Walks: Coordinate all roadway work with authorities having jurisdiction. Cut and/or bore under roadways for connection of utilities as required. Coordinate work through General Contractor. Where this contractor cuts or breaks roadways or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

D. Initial cutting and patching shall be the responsibility of the General Contractor, with the Mechanical Contractor being responsible for laying out and marking any and all holes required for the reception of his work. No structural beams or joists shall be cut or thimbled without first receiving the approval of the Architect. After initial surfacing has been done, any further cutting, patching and painting shall be done at this Contractor's expense.

1.18 PAINTING

A. Painting shall be provided by General Contractor’s painting sub-contractor, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additions cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. Paint all exposed piping inside and outside of building. Label all piping after painting as required. Utilize industry standard paint colors for respective system unless directed otherwise by Architect. Review proposed color scheme with Architect/Engineer prior to ordering materials.

E. All piping shall be color coded per the following:

1.	Domestic Cold Water Piping	Blue
2.	Domestic Hot Water Piping	Green
3.	Gas Piping	Yellow

1.19 CLEANING AND ADJUSTING:

A. Upon completion of his work, the Contractor shall clean and adjust all equipment, controls, valves, etc.; clean all piping, ductwork, etc.; and leave the entire installation in good working order.

1.20 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

B. COPIES OF SHOP DRAWINGS WILL NOT BE ACCEPTABLE AS OPERATION AND MAINTENANCE INSTRUCTIONS.

C. This information shall be bound in plastic hardbound notebooks with the job name, Architect and Engineer names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Architect for approval.

D. In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

E. The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract.

1.21 GUARANTEE

A. The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall exclude only the changing or cleaning of filters. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

B. If the Contractor's office is in excess of a fifty (150) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect for his approval.

1.22 LOCAL CONDITIONS

A. The location and elevation of all utility services is based on available surveys and utility maps and are reasonably accurate; however, these shall serve as a general guide only, and the Contractor

shall visit the site and verify the location and elevation of all services to his satisfaction in order to determine the amount of work required for the execution of the Contract.

B. The Contractor shall contact the various utility companies, determine the extent of their requirements and he shall include in his bid all lawful fees and payments required by these companies for complete connection and services to the building, including meters, connection charges, street patching, extensions from meters to main, etc.

C. In case major changes are required, this fact, together with the reasons therefor, shall be submitted to the Architect, in writing, not less than seven (7) days before the date of bidding. Failure to comply with this requirement will make the Contractor liable for any changes, additions and expenses necessary for the successful completion of the project.

1.23 MINOR DEVIATIONS

A. Plans and detail sketches are submitted to limit, explain and define conditions, specified requirements, pipe sizes and manner of erecting work. Structural or other conditions may require certain modifications from the manner of installation shown, and such deviations are permissible and shall be made as required. However, specified sizes and requirements necessary for satisfactory operation shall remain unchanged. It may be necessary to shift ducts or pipes, or to change the shape of ducts, and these changes shall be made as required. All such changes shall be referred to the Architect for approval before proceeding. Extra charges shall not be allowed for these changes.

B. The Contractor shall realize that the drawings could delve into every step, sequence or operation necessary for the completion of the project, without drawing on the Contractor's experience or ingenuity. However, only typical details are shown on the Plans. In cases where the Contractor is not certain about the method of installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

C. In general, the drawings are diagrammatic and the Contractor shall install his work in a manner so that interferences between the various trades are avoided. In cases where interferences do occur, the Architect is to state which item was first installed.

1.24 VALVE TAGS

A. Secure metal tags to all valves. Labeling on all valve tags shall include type of system the valve controls and the area of building, zone, or equipment number affected by valve operation. Tag shall be 2"minimum diameter brass, engraved with code number, service and size. A framed list of the valves, giving manufacturer's name, model number, type and location shall be mounted in the main basement equipment room.

1.25 LABELING MECHANICAL EQUIPMENT

A. All equipment furnished under Division 0 & 01 of contract documents shall be labeled with permanent laminated plate secured to equipment. Units shall be labeled as indicated on plans and schedules.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 22 00 00

SECTION 22 05 00 BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 PIPE

A. Sanitary Sewer Waste and Vent Lines wthin building:

1. Piping below slab in the existing building shall be Sch 40 PVC.
2. Sewer vents above ceiling in the existing building return air plenum shall be **cast iron - no hub**.
3. Piping above and below slab in the new addition, unless otherwise shown or specified, shall be constructed of solid wall Schedule 40 PVC "DWV" plastic pipe and fittings with solvent welded joints.

B. Site Sanitary Sewer Lines Between Manholes

1. Pipe (diameters 6-inch through 15-inch): ANSI/ASTM D 2241, SDR 26, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exc eed 10 parts (by weight) per hundred of PVC resin in the compound.
2. Pipe (diameters 18-inch through 27-inch): ANSI/ASTM D 3034, SDR 35, 12454-B PV C cell classification in accordance with ASTM D 1784; additives and fillers shall not e xceed 10 parts (by weight) per hundred of PVC resin in the compound.
3. Joints: Push on type joint in accordance with ASTM D 3212; flexible elastomeric seals (gaskets) in accordance with ASTM F 477.
4. Fittings: Same material and cell classification as pipe.
5. PVC pipe and fittings shall be green in color.

C. Compressed air piping and fittings:

1. Compressed air piping and fittings shall be Sch 40 Galvanized steel.

D. Domestic Cold and Hot Water Lines:

1. All such lines shall be Government Type "L", hard copper water tubing of standard weight and thickness as made by Mueller, Chase, Anaconda or equivalent, unless indicted otherwise. Use 95-5 lead-free solder on all piping above slab. Use Silfos 1000° lead-free solder on all piping beneath the slab.
2. In certain areas, type "L" soft copper without joints below slab shall be used only where indicated on the Plans. Piping shall be completely insulated per Section 220700.
3. Domestic cold water lines penetrating concrete slabs shall be wrapped with "Protect-O-Sleeve" vinyl flexible tube as manufactured by Robert H. Harris Co., or equivalent.
4. Domestic hot water lines shall be insulated at all penetrations through slab per insulation (see Section 220700).
5. Domestic cold water piping within 5'-0" of building may be Schedule 40 PVC plastic pipe with solvent welded joints, or slip joint fittings with EPDM seals. Provide thrust blocks all at changes in direction. Installation shall be in accordance with manufacturer's recommendations.

E. Water Heater Relief Lines:

1. These shall be Government Type "L" hard copper.

F. Equipment Drain Lines:

1. These shall be Government Type "L" hard copper.

G. Trap Primer Lines:

1. All such lines shall be Type "L" soft copper, without joints.

H. Installation of Piping:

1. All pipe shall be true and straight, without sags or traps.
2. The Contractor shall exercise care in cleaning joints after making cuts on pipe to prevent pipe particles from entering the system.
3. All pipe fittings shall be same as piping specified unless indicated otherwise.
4. Arrange, install piping approximately as indicated, straight, plumb and as direct as possible; form right angles, or parallel lines with building walls. The most practical appearance of piping runs is required. Keep pipes close to walls, partitions, ceilings; off-set only where necessary to follow walls as directed.
5. Before installing piping, check plumbing and HVAC drawings with architectural, mechanical, structural, electrical drawings; make accurate layout of plumbing and HVAC piping. Where interferences may appear and departures from indicated arrangements are required, consult with other trades involved; come to agreement as to changed locations and elevations of piping; obtain approval of proposed changes. Note runs of other contractor's piping and large conduits and cooperate to achieve neat appearance.
6. Unless otherwise indicated, conceal all piping in building construction in finished areas. Install such piping in time so as not to cause delay to work of other trades and to allow ample time for tests and approval; do not cover before approval is obtained.
7. Locate groups of pipes parallel to each other and building lines; space them at distance to permit access for servicing, valves, and to create most practical appearance when racked with conduits, refrigerant, etc., provided by other contractors.
8. Keep fixture branches concealed to points above floor close to fixtures; expose only as much as necessary for final connection. Rigidly support pipes projecting from walls, chases, etc. in wall or chase to make firm, well-braced installation. Loosely supported pipe or accessory is not acceptable.
9. Install horizontal piping to coordinate with other trades and install without sags or humps.
10. Grade inside sewer piping at uniform slope of 1/4 inch per foot, minimum; where this is impossible, maintain slope as directed but in no case less than 1/8 inch per foot. Waste lines 3 inches and smaller must grade at minimum 1/4 inch per foot. See Drawings for fall on exterior sewer lines.
11. Grade other piping as specified under heading or service where used, or as directed.
12. Keep piping free from scale and dirt, protect open pipe ends wherever work is suspended during construction. To prevent foreign bodies entering and lodging in pipe, use temporary plugs or other approved material.
13. Where changes in pipe sizes occur, do not bush down; use only reducing fittings. For drainage piping changes in direction, use longsweep bends where possible; otherwise, short sweep 1/4 bends or combination Y and 1/8 bends; also Y's in combination with other bends.
14. Provide shut off valves at all supply connections to all equipment. Supplier of equipment shall provide rough-in drawings and this contractor shall fully connect all items, supply necessary piping and fittings as required, unless otherwise noted individually.

15. Do not locate valves with stems below horizontal.
16. Locate valves for easy access and operations. Where concealed, notify General Contractor of exact location in order that he may leave openings for access panels. Provide access panels.
17. Provide unions, screwed or flanged, where indicated, and in following locations even if not indicated.
18. In by-passes around equipment.
19. In connection to equipment requiring disconnection for repairs or replacement. Locate between shut-off and equipment.
20. Weld-O-let fittings shall be used in iron pipe.
21. All screwed fittings and pipe shall have threads cut to standard pipe thread dimensions. Pipe shall be properly reamed after cutting of threads.
22. Joint compound, Rector Seal Series 100, LACO Series Slick-tite or equal thread lubricant shall be applied to male threads of the screwed pipe and fittings only.
23. Approved expansion joints or flexible couplings shall be provided as necessary.
24. Care shall be taken in making up pipe and fittings such that the pipe does not extend into fitting sufficiently to reduce the waterway.
25. Standard, one-piece reducing fittings of approved design shall be used wherever a change in size is made. Changes in pipe sizes shall not be made by means of reducing flanges.
26. Bushings may be used only where standard, one-piece reducing fittings are not available and shall be subject to the following:
    a. Bushings shall be of the face or flush type.
    b. Bushings shall not be used in elbow fittings.
    c. Bushings shall not be used when the reduction in size of the outlet is less than ½".
    d. Bushings shall not be used in more than one outlet of any tee or two outlets of any cross fitting.

1.2 PIPE SPECIALTIES

A. Dielectric unions shall be used between copper and iron pipe.

1.3 PIPE HANGERS AND SUPPORTS

A. This Contractor shall furnish and install all foundations and supports required for his equipment unless indicated otherwise on the Drawings.

B. This Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping and he shall cooperate with other trades in locating and placing these items.

1.4 PROVIDE SLEEVES FOR ALL PIPES PASSING THROUGH WALLS, FLOORS, BEAMS, ETC.

A. Sleeves passing through structural members or concrete footings shall be of cast iron or Schedule 40 steel pipe. Sleeves passing through nonstructural walls or floors shall be of 26 gauge galvanized iron. Joints between sleeves and pipes passing through floors shall be made weather tight with plastic materials. Where pipes pass through water proofing membrane, flashing sleeves shall be installed.

B. Provide Grinnell, Fee & Mason, or equivalent malleable iron split ring hangers with rod supports throughout. STRAP HANGERS OR WIRE WILL NOT BE ACCEPTED.

C. Maximum spacing of hangers for cast iron pipes shall be 5 ft.; for other than soil, use 10 ft.

D. Provide galvanized iron shields between hangers and pipe covering.

E. Provide Grinnell, Fee & Mason, Crane or equivalent heavy steel riser clamps on vertical risers at floors to support pipes.

F. Provide producer speciality, Jones Manufacturing or equal chrome plated brass escutcheons wherever pipes pass through floors, walls or ceilings in exposed or finished areas.

G. All piping projecting from chases shall be rigidly supported in the wall or chase. Loosely supported fixtures or accessories will not be accepted.

1.5 VALVES AND UNIONS

A. Furnish and install all valves, unions, stops, connections, etc. shown on plans and necessary to make a complete system in working order. Provide valves on inlet and outlet of all equipment and fixtures and on branch lines to fixtures or groups of fixtures.

B. Ball Valves, 3" and smaller, rated for 150 PSI saturated steam pressure, 600 PSI WOG pressure; shall be 2-piece construction, bronze body conforming to ASTM B-62, conventional port, chrome-plated brass ball, replaceable TFE seats and seals, blow-out proof stem, and vinyl-covered steel handle. Provide solder ends for condenser water, chilled water and domestic hot and cold water service of NIBCO Design S-580-70, Milwaukee BA-150-S or equal, threaded ends of heating hot water and low pressure steam of NIBCO Design T-580-70, Milwaukee BA-100-S or equal. For chilled water insulated piping systems, provide ball valves with extended stem, insulated handle with protective thermal barrier sleeve to prevent condensate moisture drip and pipe insulation deterioration. At Contractor's option, Victaulic Style 722 or 721 ball valves may be used.

C. All valves, unions, etc. where pipe is chrome plated shall have similar finish. All exposed supplies to plumbing fixtures shall be chrome plated.

D. All gas cocks, valves, etc. on gas lines shall have local utility company and AGA approval.

E. Domestic water valves (below grade): M & H AWWA Series C-509 resilient gate valve with low torque operation, positive shut-off, O- Ring seals, full epoxy coating and square valve stem end. Provide two (2) adjustable "TEE" handle valve wrenches to be turned over to the owner after construction is complete.

F. Gate Valves, 2-Inch and Smaller: MSS SP-80; Class 125, body and bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy or bronze stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

G. Gate Valves, 2-Inch and Smaller: (Hot Water Heating) MSS SP-80; Class 150, body and union bonnet of ASTM B 62 cast bronze; with threaded or solder ends, solid disc, copper-silicon alloy or bronze stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Do not use solder end valves for hot water hearing piping applications.

H. Gate Valves, 2-1/2-Inch and Larger: MSS SP-70; Class 125 iron body, bronze mounted, with body and bonnet conforming to ASTM A 126 Class B; with flanged ends "Teflon" impregnated packing, and two-piece backing bland assembly.

I. Globe Valves, 2-Inch and Smaller: NSS SP-80; Class 125; body and screwed bonnet of ASTM B 62 cast bronze; with threaded or solder ends, brass or replaceable composition disc, copper-silicon alloy stem, brass packing gland, "Teflon" impregnated packing, and malleable iron handwheel. Provide Class 150 valves meeting the above where system pressure requires.

J. Butterfly Valves, 2-1/2-Inch and Larger: MSS SP-67; rated at 200 psi; cast-iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide "Non-Leakage" full threaded lug flange body type capable of being broken down at one side of the valve remaining closed. Drill and tap valves on dead-end service or requiring additional body strength. At Contractor's option Victaulic 300 BFV for grooved piping systems maybe used.

K. Swing Check Valves, 2 Inch-and Smaller: MSS SP-80; Class 125 cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

L. Swing Check Valves, 2-1/2-Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection piping system), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast-iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line. At Contractor's option, Victaulic Style 716 for grooved piping systems may be used.

M. Wafer Check Valves: Class 2500, cast-iron body; with replaceable bronze seat, and non-slam design lapped and balanced twin bronze flappers and stainless steel trim and torsion spring. Provide valves designed to open and close at approximately one foot differential pressure.

N. Lift Check Valves, 2 Inch-and Smaller: Class 125; cast-bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, with stainless steel spring, bronze disc holder with renewable "Teflon" disc, and threaded ends. Provide valves capable of being refitted and grounded while the valve remains in the line.

O. Select Valves with the following ends or types of pipe/tube connections:

1. Copper Tube Size 2 Inch and Smaller: Solder ends, except provide threaded ends for heating hot water.
2. Steel Pipe Sizes, 2 Inch and Smaller: Threaded or grooved end.
3. Steel Pipe Sizes, 2-1/2 Inch and Larger: Grooved end or flanged.

1.6 INSTALLATION OF VALVES

A. Use ball and butterfly valves for shut-off duty.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves and unions for each fixture and item of equipment arranged to allow equipment removal without system shutdown. Unions are not required on flanged devices.

D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.

E. Install valves in horizontal piping with stem at or above the center of the pipe.

F. Install valves in a position to allow full stem movement.

G. All valves, unions, etc. where pipe is chrome plated shall have similar finish. All exposed supplies to plumbing fixtures shall be chrome plated.

H. All valves, on insulated piping shall be complete with extended lever handle stem.

1.7 SHOCK ABSORBERS

A. All water service to fixtures or groups of fixtures shall have concealed air chambers. Air chambers shall be of the same diameter as the supply or header pipes and 12 inches long on both hot and cold water branches. Locate shock absorbers close to fixture or at end of header.

B. Shock arrestors shall be installed for sterilizer water supplies.

C. On lines 1-1/4" and above fixtures with quick closing valves (i.e.: Dishwashers, tempered valves, etc.) install "Shock Trol", "Precision Plumbing Products" or equal water hammer arrester properly sized for each unit.

1.8 ESCUTCHEONS

A. Provide escutcheons for all exposed lines passing through floors, walls, and ceilings. They shall be chrome plated brass and shall be of such flange size as to cover necessary penetrating openings.

1.9 FLASHING

A. Flash all vent penetrations through roof. Extend flashing approximately 10 inches in all directions at base and turn ends down into top of pipe. Off-set vents where necessary to provide 4 feet minimum clearance from other flashing such as outside walls, curbs, etc. Note: All vents shall be 25 feet from fresh air intakes.

1.10 TEST

A. Make such tests of work as specified, or required by Architect or by State and Municipal Bureaus having jurisdiction, and under their supervision. Perform tests in presence of Architect's representative. Notify Architect two days prior to testing.

B. Provide apparatus, temporary piping connections, or other requirements necessary for tests. Take precautions to prevent damage to building or contents by tests. Contractor is required to repair and make good at his expense damage so caused.

C. Correct leaks, defects, or deficiencies discovered as result of tests. Repeat tests until test requirements are fully complied with. Caulking of pipe joints to remedy leaks is not permitted, except on lead and oakum joints.

1.11 ACCESS PANELS

A. Furnish and install access panels where valves, dampers, control boxes, etc. are concealed in walls, ceilings, floors, or otherwise inaccessible or where specifically called for on plans. Panels shall be Milcor Style DW, or Bar-Co. Model 500, J-L Industries Model WB, or equal sized as required and furnished with prime coat finish.

1.12 PIPE MARKERS

A. Provide pipe markers and directional arrows on all piping in mechanical equipment rooms, or which is exposed in building, and on both sides of all valves located above ceiling. Markers shall be as manufactured by W.H. Bradley Co., or the equivalent. All letters shall be color-coded and sized as recommended by OSHA. Samples of the type of letters to be used shall be submitted with shop drawings.

B. The following pipe and valves shall be identified:

	Piping	Valves
Domestic Cold Water	X	
Domestic Hot Water Supply	X	
Domestic Hot Water Return	X	
Compressed Air Piping	X	

C. Pipe markers with arrows shall indicate lines content and shall be located 20 feet on center and at each change of direction of line. Identification bands shall be color coded to match pipe markers and shall be provided 10 feet on center. Pipe identification markers shall be taped at each end and shall be taped around the entire circumference of pipe.

END OF SECTION 22 05 00

CITY OF LAKE CHARLES
LOUISIANA

STANDARD SPECIFICATIONS
for
INFRASTRUCTURE CONSTRUCTION

LAST REVISED
December 12, 2017

THE CITY OF LAKE CHARLES, LA
STANDARD SPECIFICATIONS FOR INFRASTRUCTURE CONSTRUCTION

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SECTION 1
SANITARY SEWER COLLECTION SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing labor, materials and services for the construction of a gravity sanitary sewer collection system and shall consist of furnishing and installing sanitary sewer manholes, PVC pipe designated for gravity flow sanitary sewers, service lines and riser pipes, in accordance with these specifications, and in conformity with the lines and grades shown on the plans or established by the Engineer. This item includes furnishing, transporting, excavations, bracing, bedding, dewatering, laying, jointing, testing, backfilling, and surface cleanup.

B. All Sanitary Sewer collection systems shall be designed such that the absolute minimum extents of the collection system are to be installed beneath paved surfaces. The City of Lake Charles Waste Water Department reserves the right to grant waivers on the basis of special conditions; however, no sanitary sewer collection system designed completely beneath the paved surfaces will be accepted.

C. Proposed developments not scheduled to be dedicated to the City of Lake Charles shall have permanent medallions affixed to all manhole lids and ductile iron cleanout covers. Medallions shall be stamped with the words “PRIVATE SYSTEM” designating the system as a private system not to be maintained by the City of Lake Charles.

1.02 REFERENCES

A. All materials and designs shall conform to the requirements of these specifications. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. Louisiana Department of Health (LDH)
2. American Society for Testing and Materials (ASTM)
3. American Concrete Institute (ACI)
4. Concrete Reinforcing Steel Institute (CRSI)
5. American National Standards Institute (ANSI)
6. American Water Works Association (AWWA)
7. The Society for Protective Coatings (SSPC)
8. National Sanitation Foundation (NSF)

B. The same manufacturer shall supply all like materials and equipment of the same class, unless specified to the contrary.

1.03 SUBMITTALS

A. Submittals shall be made available to the City of Lake Charles Wastewater Division at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Wastewater Division for approval prior to acceptance of the sanitary sewer system. Project record documents shall accurately record locations of pipe runs, service connections, manholes, and invert elevation.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the sanitary sewer collection system must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications established by the Wastewater Division;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City;

5. Located on acceptable rights-of-way or readily accessible maintenance easements to be granted to the City; and

6. Accurately depicted in record documents to be submitted.

1.05 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the Owner within the guarantee period.

PART 2 PRODUCTS

2.01 GENERAL

A. Where a certain pipe material is specified on the plans, only that material can be used. All pipe material used between consecutive manholes in the sewer line, including fittings, service connections, plugs, etc., shall be of the same kind unless otherwise provided by the plans.

B. No gravity sewer collection line shall be less than 8-inches in diameter.

C. No sanitary sewer service line shall be less than 6-inches in diameter, and all services shall be provided with independent clean-outs of like size and pipe material. All sewer service lines shall serve a single residence, or a single building with no interconnectivity.

D. Sanitary sewer manholes shall be either an approved fiberglass manhole or pre-cast concrete manholes complete with a multi-component stress panel liner system.

E. Manholes located outside of paved surfaces shall be constructed to provide a rim elevation extending 3-inches above finished grade, including the sodded grass line, to prevent excess inflow during rain events.

2.02 GRAVITY SANITARY SEWER PIPE

A. Polyvinyl Chloride (PVC) Pipe and Fittings

1. Pipe (diameters 6-inch through 15-inch): ANSI/ASTM D 2241, SDR 26, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.

2. Pipe (diameters 18-inch through 27-inch): ANSI/ASTM D 3034, SDR 35, 12454-B PVC cell classification in accordance with ASTM D 1784; additives and fillers shall not exceed 10 parts (by weight) per hundred of PVC resin in the compound.

3. Joints: Push on type joint in accordance with ASTM D 3212; flexible elastomeric seals (gaskets) in accordance with ASTM F 477.

4. Fittings: Same material and cell classification as pipe.

5. PVC pipe and fittings shall be green in color.

B. Ductile Iron Pipe

1. Pipe shall be designed in accordance with ANSI Specification A21.50 (AWWA C-150) for 150 psi working pressure. Ductile iron pipe shall have a minimum tensile strength of 60,000 psi with minimum yield strength of 42,000 psi (per AWWA M-41). Design shall be done for external and internal pressures separately using the larger of the two for the net design thickness. Additional allowances shall be made for service allowance and casting tolerance per AWWA C150.

2. Pipe shall be manufactured in accordance with ANSI Specification A21.51 (AWWA C-151), latest revision.

3. All ductile iron pipe shall have a bituminous-coated exterior and ceramic epoxy lined interior, as well as, polyethylene wrap. The ceramic epoxy lining shall be a two component amine cured novalac epoxy of at least 87 percent solids. Lining material shall be Protecto 401 by Induron Coatings, Birmingham, AL or prior approved equal, and shall

be installed in accordance with the manufacturer's recommendations, but not less than a 40 mil DFT.

4. Polyethylene wrap shall be installed on all buried DI piping and fittings. Polyethylene encasement furnished under these Specifications shall conform to AWWA C-105 or ANSI A21.5. Film shall be Class "C" Black, with a minimum nominal thickness of 0.008 inches (8 mils).

5. UNRESTRAINED PIPE JOINTS: Ductile iron pipe joints shall be push-on rubber gasket type or rubber-gasket mechanical joint per AWWA C111 in unrestrained applications. Unrestrained pipe joints shall be by one of the following or an approved equal:

   a. "Tyton Joint Pipe" by US Pipe and Foundry Company.

   b. "Fastite Joint Pipe" by the American Cast Iron Pipe Company.

   c. "Tyton Joint Pipe" or "Fastite Joint Pipe" by McWane Company.

6. Ductile iron fittings for gravity systems shall be mechanical joint ductile Iron fittings manufactured in strict accordance with AWWA C153, AWWA C110 and AWWA C111. The rated working pressure shall be 350 psi for 24-inch and smaller and 250 psi for 30-in and larger. All fittings must be manufactured in the United States. All ductile iron fittings shall have a bituminous-coated exterior and ceramic epoxy lined interior, as well as, polyethylene wrap. The Epoxy ceramic lining shall be a two component amine cured novalac epoxy of at least 87 percent solids. Lining material shall be Protecto 401 by Induron Coatings, Birmingham, AL or prior approved equal, and shall be installed in accordance with the manufacturer's recommendations.

C. Differential Pipe Connections and In-Service Line Connections

1. Connect pipe of dissimilar material with manufactured adapters specifically intended for this purpose. Devices shall be manufactured by Fernco Systems or approved equal.

2. Service connections made on active, or completed sewer lines, shall be shall be established with gas tight, root-proof and leak-proof sewer service tapping saddles and shall conform to ASTM D5926. Sewer saddles shall be Flexible Tap Saddles, as manufactured by Fernco Systems, T-Flex Sewer Saddles, as manufactured by Mission Rubber Company, or approved equal.

2.03 CASING FOR JACKING AND BORING

A. Unless otherwise required by the agency having jurisdiction, the casing shall be welded steel pipe meeting ASTM A53, Grade B, and have a minimum yield strength of 35,000 psi. The exterior of the casing pipe shall be coated with coal tar epoxy or bituminous asphalt. Minimum wall thickness shall be as shown in the following table:

Table for minimum wall thickness for steel casing pipe for E72 loading		
Carrier Pipe Nominal Diameter (inches)	Min. Casing Pipe Diameter (O.D.) (inches)	Nominal Thickness (inches)

6	12	0.344
8	16	0.375
10	20	0.407
12	24	0.469
14	27	0.505
16	30	0.505
18	30	0.505
20	36	0.595
24	36	0.595
30	42	0.625
36	48	0.688
42	60	0.844

2.04 CONCRETE MANHOLES

A. Concrete Manholes

1. All manholes shall consist of precast concrete sections, including integral base section, riser sections, conical sections, and shall conform to ASTM C 478 and the dimensions shown on the Drawings. Conical sections shall be designed to support cast iron frames and covers under AASHTO HS-20 loading. Axial length sections shall be selected to provide correct total height required with the fewest joints. All conical sections shall be eccentric.

2. Base for precast manholes may be either pre-cast or cast-in-place. Cast-in-place bases shall be used exclusively for manholes built over existing sewer lines only.

3. All concrete manholes shall be coated with a multi-component stress panel liner system as further detailed herein.

B. Joint Gaskets

1. All pre-cast manhole joints shall be sealed with flexible watertight gaskets conforming to ASTM C 990 or C443. Gaskets shall be “RAM-NEK” or “RUB-R-NEK” gasketing material, or approved equal, installed as specified by the manufacturer.

C. Pipe Penetration Gaskets

1. All pipe penetrations shall be installed with watertight resilient gasket conforming to ASTM C923.

2. Gaskets cast into the manhole shall be Dura-Seal III, as manufactured by Dura-Tech, Inc., or prior approved equal. Field installed gaskets shall be Kor-N-Seal Cavity O-Ring as manufactured by, NPC Inc., or approved equal, installed as specified by the manufacturer.

D. Bench and Inverts

1. For benches and inverts not integrally formed with the manhole base, 4000 psi concrete bench and inverts shall be field installed by the contractor. Benches and inverts formed with grout or mortar shall not be permitted.

E. Concrete Manhole Exterior Joint Sealant

1. Prior to backfilling, exterior joints shall be waterproofed as provided below.

2. Concrete manhole exterior joints shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc. The seal shall be made of a stretchable, self-shrinking, intra-curing halogenated based rubber with a minimum thickness of 30 mils and 18-inch width. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint. The exterior joint sealants shall be installed per the manufacturer's recommendations.

F. Multi-Component Stress Panel Interior Liner System

1. The multi-component stress panel lining system, shall be designed for sanitary sewer applications, and shall utilize a mechanical anchoring system at all terminations. Surface preparation and liner installation shall be completed according to the manufacturer's recommendations and by a manufacturer certified installer.

2. The total thickness of the liner system shall be a minimum of 500-mils DFT.

3. The complete coating system shall include a 10-year limited warranty covering both materials and installation, beginning at the date of final acceptance.

4. The multi-component stress panel interior lining system shall be SpectraShield, as manufactured by CCI Spectrum, Inc., or approved equal.

5. The liner shall be affixed with or stamped with a permanent, easily legible completion date.

2.05 FIBERGLASS MANHOLES

A. Fiberglass Manholes

1. Provide prefabricated fiberglass manholes which conform in shape, size, dimensions, and details shown on Drawings. Unless modified by Drawings, use manhole sections conforming to ASTM D 3753.

2. Provide fiberglass manholes manufactured by one of the following suppliers:
   a. LFM Manufacturing, Giddings, Texas.
   b. Containment Solutions, Conroe, Texas

c. City approved equal

3. Mark date of manufacture and name or trademark of manufacturer in 1-inch high stenciled letters on inside of barrel.

4. Unless larger size is required, provide 48-inch-diameter barrel for fiberglass manholes. Provide wall section thickness for depth of manhole according to ASTM D 3753, but not less than 0.48 inches in thickness.

1. Provide fabricated reducer bonded at factory to form one continuous unit at top of manhole barrel to accept concrete grade rings and cast iron frame and cover. Reducer design shall be of sufficient strength to safely support HS-20 loading in accordance with AASHTO. Manway reducers shall be eccentric with respect to the centerline of the manhole riser section.

5. Fiberglass manholes shall have a fiberglass-reinforced bottom plate. Fiberglass stiffening ribs shall be used, where required, to provide sufficient stiffness to bottom plate. All bottom plates shall have an external anti-flotation flange extending 2.5-inches (min) beyond manhole outside diameter. The manhole bottom shall be 0.5-inches thick (minimum).

B. Reinforced Concrete Manhole Base Section

1. Fiberglass manholes shall be set in a cast-in-place reinforced concrete slab base. Concrete slab base should be a minimum of 12” thick for up to 48” diameter manholes (16” thickness for larger diameter manholes). Concrete slab should extend a minimum of 12” beyond manhole outside wall for manholes up to 20’ in depth (24” up to 35’ in depth). The minimum reinforcement for the concrete slab shall be #5 rebar at 8-inches on-center-each-way. The fiberglass reinforced bottom plate shall be imbedded 3.5-inches into the reinforced concrete slab.

C. Pipe Connections

1. Pipe connections shall be pipe stub-outs or boot-type connections. Installation of PVC or FRP stub-outs shall be performed by sanding, priming, and using a fiberglass-reinforced laminate to bond the stub-out to the manhole wall. The resin and fiberglass shall be the same type and grade as used in the fabrication of the manhole. Boot-type pipe connections shall Kor-N-Seal, Press-Seal, Inserta-Tee or approved equal. Where required, Manufacturer shall use a fiberglass-reinforced sleeve to accommodate boot connections.

2. Doghouse manhole pipe connections shall not be permitted when using fiberglass manholes. Where the installation requires dog-house installation methods a reinforced concrete manhole shall be required.

D. Manhole Bench and Invert

1. Fiberglass enclosed bench and invert shall be installed by the Manufacturer, Manufacturer's agent or approved equal. The invert will be formed using a corrosion resistant material and completely enclosed in 0.25-inches (min) of fiberglass laminate.

2. For benches and inverts not integrally formed with the manhole base, 4000 psi concrete bench and inverts shall be field installed by the contractor. Benches and inverts formed with grout or mortar shall not be permitted. Concrete bench and invert shall be field installed by the installing contractor in accordance with fiberglass manhole manufacturer's requirements and these specifications.

2.06 MANHOLE APPURTENANCES

A. Riser Rings

1. Riser rings shall be standard product, manufactured particularly for use in manhole construction, sized to fit the cones on which they are placed, and the wall thickness shall be not less than that of the cones.

2. Concrete riser rings shall be not less than two inches high, nor more than four inches high. Concrete riser rings shall be free from cracks, voids, and other defects and shall conform to ASTM C478. Joints shall be provided with exterior waterproofing system as provided below.

3. Cast iron riser rings shall conform to the latest edition of AASHTO M306. Cast iron riser rings shall be used for adjustment of manhole frame and cover of less than four (4) inches. Joints shall be provided with exterior waterproofing system as provided below.

4. Cast-iron riser rings shall be completely coated with an environmentally safe, water-based asphaltic coating which is non-toxic, non-flammable, colorless, and dries to a hard black finish. The coating shall be applied to the casting prior to the installation of the external waterproofing.

B. Manhole Frames and Covers

1. All manhole covers shall have the word "SEWER" cast into the top in letters approximately three inches high.

2. Manhole frames and covers shall be cast-iron, and conform to the design and dimensions shown on the Drawings and Standard Details. Grade shall be as designated in the Contract Drawings. Contact surfaces between frames and covers shall be machined to provide a uniform contact surface. When locking devices are specified, the CONTRACTOR shall submit Shop Drawings for approval by the ENGINEER.

3. For roadway applications the standard manhole frame and cover shall be East Jordan Iron Works Model V-1501 and Model V-1403, or approved equals.

4. For non-roadway applications the standard manhole frame and cover shall be East Jordan Iron Works 'Hinged Manhole Assembly, Catalog No. 24' ERGO (Product No. 00104175L02), or approved equal.

5. For watertight applications the standard sewer manhole frames and covers shall be East Jordan Iron Works Model V-2480-1, or approved equal.

6. Cast-iron frames and covers shall be completely coated with an environmentally safe, water-based asphaltic coating which is non-toxic, non-flammable, colorless, and dries to a hard black finish. The coating shall be applied to the casting prior to the installation of the external waterproofing.

C. Miscellaneous

1. Bentonite-Cement sealing plaster shall consist of two parts bentonite, one part Type 3 cement, and one part sand, with sufficient water to obtain workable consistency.

2. Mortar shall consist of one part Portland Cement to two parts clean, well-graded sand which will pass a No. 4 screen. Admixtures may be used not exceeding the following percentages of weight of cement; hydrated lime, 10%; diatomaceous earth or other inert material, 5%. Consistency of mortar shall be such that it will readily adhere to the surface. Mortar mixed for longer than thirty minutes shall not be used. A non-shrink mortar may be submitted for approval as a substitute.

3. Grout shall be non-shrink cementitous grout and shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

D. Manhole Inflow Protector Insert

1. The completed manhole inflow protector and its associated valve body and components shall be manufactured from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with wastewater collection systems.

2. The manhole insert body shall be designed with six equally spaced re-enforcement ribs (1 1/2" wide, 1/2" deep, and 6 1/2" long) in the bottom and will support a minimum uniform load of 800 pounds. The insert body shall have a recessed area in the center of the bottom for protection of the valve body. The insert body shall be fabricated from Acrylonitrile Butadiene-Stryrene (ABS) high impact, high grade material specifications under ASTM D-256 method A, D-638, D-790, D-785, D-648 method A and D-635.

3. The insert shall be provided with a gasket made of closed cell neoprene and have a pressure sensitive adhesive on one side and be placed under the insert body rim by the manufacturer. The adhesive shall be compatible with the insert body material so as to form a long lasting bond in either wet or dry conditions of use.

4. The gas relief valve shall be designed to relieve at a pressure of 1 psi and have a water leak down rate not to exceed 5 gallons per 24 hours. The valve shall be installed by means of a threaded hole tapped in the center of the insert body by the manufacturer

5. The insert shall be provided with a corrosion resistant handle or lifting strap which do

not interfere with the installation of the manhole lid. The handle or lifting straps shall have a minimum combined 1100 pound tensile strength and shall be attached to the insert, by the manufacturer, with corrosion resistant fasteners.

6. Manhole inflow protector inserts shall be Rain Guard Model LFN-SV, as manufactured by L.F.M. Manufacturing, Inc. Giddings, Texas, or approved equal.

2.05 CLEANOUTS

A. Cleanouts at the ends of sanitary sewer lines shall be constructed of the same quality pipe material and size (6-inch) as the service line. Cleanouts shall consist of 6-inch pipe, fittings, threaded cleanout adapter, threaded cleanout plug.

B. All new cleanouts shall be installed within a new concrete box. All new clean out boxes shall be model no. C.H. 5/8”x3/4” Concrete Boxes manufactured by Southern Meter Box, Inc., or approved equal. Concrete meter boxes shall be provided with a solid cast iron lid marked SEWER and shall be model No. T. 5/8”x3/4” Lid as manufactured by Southern Meter Box Inc., or approved equal.

2.06 CONCRETE

A. Cement shall be Type II Portland Cement conforming to ASTM C 150.

B. Concrete for Manholes and cast in place manhole bases: 4500 psi minimum at 28 days, 6.2 sacks of cement minimum per cubic yard.

C. Concrete for benches and inverts not integrally formed with the manhole base: 4000 psi minimum at 28 days, 5.8 sacks of cement per cubic yard.

D. Concrete for Embedment: 3000 psi minimum at 28 days, 5.2 sacks of cement minimum per cubic yard.

E. Test for compressive strength of concrete in accordance with ASTM C 39.

2.07 MORTAR SAND

A. Mortar sand shall be a non-plastic siliceous material conforming to the following gradation limits:

Sieve Size	Percent Finer By Weight
No. 4	100
No. 8	95 to 100
No. 100	0 to 25
No. 200	0 to 10

B. The percentage of foreign matter shall not exceed the following limits:

1. Coal of Lignite 0.25 percent
2. Clay lumps 0.50 percent

2.08 FOUNDATION, BEDDING, AND BACKFILL MATERIALS

A. Foundation Material

1. Crushed limestone or crushed Portland cement concrete shall be used for structure foundations and pipe foundation amendments as detailed herein. Crushed limestone or crushed Portland Cement Concrete foundation material shall meet the following #610 gradations.

Sieve Size	Percent Finer By Weight
1 – ½ in	100
1 - in	90 to 100
3/4 - in	70 to 95
3/8 - in	50 to 80
No. 4	35 to 65
No. 10	25 to 50
No. 40	10 to 26
No. 200	4 to 12

B. Bedding and Embedment Material

1. Crushed limestone or crushed Portland cement concrete shall be used for pipe bedding to the depths and heights identified on the project details. Crushed limestone or crushed Portland Cement Concrete bedding material shall meet the following #57 gradations.

Sieve Size	Percent Finer By Weight
1 – ½ in	100
1 - in	90 to 100
1/2 - in	25 to 60
No. 4	0 to 10
No. 8	0 to 5
No. 200	0 to 1

C. Backfill Material

1. Usable Native Excavated Soils for Trench Back Fill outside of paved surfaces shall meet the following requirements.

   a. Usable native excavated soils shall have a maximum PI of 25 and maximum organic content of five (5) percent. Soils with a silt content of fifty (50) percent or greater and also a PI of ten (10) or less will not be allowed. Any select material used to supplement or replace usable excavated soil shall meet these requirements and must be approved by the Engineer. Soil shall be tested at the Engineer and the Owner's option. Usable excavated material may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Owner's access nor inconvenience traffic adjoining property owners.

b. When excavated soils do not meet the above stated requirements they shall be removed from the site, at the contractors expense, and replaced with Select Backfill Material.

2. Sand Backfill Material

a. Sand backfill material shall be used for trench backfill when the utility line is to be installed beneath any paved surface. Sand for backfilling trenches and structures shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	Percent Finer By Weight
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

PART 3 EXECUTION

3.01 GENERAL

A. Coordinate with other utility providers to the fullest extent possible complete maximum spacing from all utilities for ease of access.

B. Sanitary Sewer lines shall be installed with wall to wall clear separations of not less than 6-feet horizontally and 18-inches vertically from potable water lines. Where these separations are not able to be met, the line shall be encased in concrete.

C. Any materials damaged during installation shall be removed and discarded.

3.02 ALIGNMENT AND GRADE

A. Prior to excavation, the Engineer will provide alignment and location of manholes.

B. The Engineer will establish the location of all sewer lines to be constructed and will set bench marks at prominent points adjacent to the work. He will set stakes at each manhole, off-set markers at 50’ centers along the lines, and will develop and present to the Contractor all necessary cut sheets. The Contractor shall develop all grades, slopes, etc., there from and shall be responsible for the conformity of the work to the layout, cut sheets, elevation, etc., provided him.

C. Uncover, relay and backfill installed pipe where horizontal and vertical alignment is determined by Engineer, or the City, to be unacceptable or erroneous.

3.03 TRENCHING AND EXCAVATION

A. Excavation

1. Excavation shall include the removal, handling, re-handling, refill or backfilling, and

disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing, and trench box. The work of excavation shall also include the responsibility of added expenses or other liability that may arise from quicksand, obstacles or conditions, foreseen or unforeseen, which may be encountered in the work. It includes clearing and the removal of pavements, curbs, sidewalks, shrubbery, and other obstructions not otherwise provided for.

B. Lines of Excavation

1. All excavation shall be made in such manner and to such widths as will give ample room for properly installing and inspecting the piping. All excavation necessary for laying pipe, constructing manholes, etc., shall be made to line and grade as indicated on the plans and as specified herein. Trenches shall be dug to the alignment and depth required and only so far ahead of the pipe laying as the Engineer will permit. The trench shall be braced and drained as may be required so that workmen may work therein safely and efficiently. A trench box may be used in lieu of sheeting and shoring.

2. Bottoms of trenches shall be excavated and formed to provide for pipe bedding or pipe foundations as hereinafter specified or as required by the plans or Special Provisions.

3. Bell holes, where necessary to make up the joints, shall be dug of sufficient size that the whole length of the pipe barrel be bedded as required, and to allow all of the joints to be properly made.

4. All excavation shall be open cuts with vertical sides except in special cases where the Engineer may permit sloping sides above a point two feet (2’) above the top of the pipe, or except where tunneling is permitted or required.

5. If tunnels are authorized or required, they shall be only as large as necessary for the installation of the pipe and as approved by the Engineer or as detailed on the plans.

6. The maximum width of trench or sewer pipe installation at a point two feet (2’) above the top of the pipe shall be the external diameter of the barrel of the pipe plus nine inches (9”) on each side of the pipe.

C. Methods of Excavation

1. The Engineer shall have the authority, at any time, to require the Contractor to discontinue the use of any excavating machine or other appliance which, in the Engineer’s judgment, is not adapted to the purpose for which it is used.

D. Dewatering

1. The trenches shall be maintained free of water at all times while work is in progress, and water shall not be allowed to flow over or rise upon earth foundations, pipe, concrete masonry, or other work, except as otherwise specified for bayou crossings and special "wet areas." The Contractor shall not open more trench than the available pumping facilities can dewater to the satisfaction of the Engineer.

2. The Contractor shall assume all responsibility for disposing of all water so as not to injure or interfere with normal drainage of the locality. In no case shall water pipe lines be used as drains for such water. The ends of water pipe lines shall be adequately and properly plugged during construction by the use of approved stoppers (a garbage bag is not an approved stopper), and all necessary precautions shall be taken to prevent the entrance of ground water, mud, sand, or any other objectionable materials into the pipe lines. If such materials enter the pipe lines, they shall be removed by the Contractor as soon as possible after discovery thereof.

3. The Contractor shall use due vigilance and care so that no water originating on his work or due to his work or which he is obligated to handle and dispose of under this contract shall discharge or be discharged on the work or into the trenches of another contractor unless a mutual agreement by the parties affected has been reached. Nothing in this section is to be construed as preventing the reasonable use by the Contractor of any ditch, channel, storm drain, or gutter which is designated and used for City or Parish drainage.

E. Maintenance of Excavation

1. The Contractor shall maintain all excavation in good order during the construction, so as not to hinder or injure the pipe laying, masonry, or other work. He shall take all reasonable precautions to prevent movement of the sides of such excavation, and shall remove at his own expense any material sliding into the excavation.

F. Sheeting and Bracing

1. The Contractor shall furnish and put in place such sheeting and bracing as may be required to support the sides of all trenches or other excavations and, where required, remove, or cut off, as directed, such sheeting at his own expense. A steel trench box, supplemented with additional sheeting, may be used in lieu of total sheeting and bracing.

G. Disposal of Excavated Material

1. All material excavated shall be placed so as to interfere as little as possible with public travel. In case the street is not wide enough to allow the dirt to be piled up without blocking the sidewalk, the Contractor shall, at his own expense, maintain an open passageway not less than two and one-half feet (2 ½') wide on the sidewalk and shall keep this passageway free from mud and slush.

2. The Contractor may deposit excavated materials directly in permanent position insofar as is consistent with the proper prosecution of the work. Materials that cannot be placed at once in permanent position shall be deposited in temporary storage piles. All this work shall be done with reasonable neatness and excavated materials shall not be carelessly strewn over the area.

3. Surplus excavated material over and above that required for backfilling, mounding over the pipe and making other fills and embankments to the finished lines and grades

indicated on the drawings shall be disposed of as directed by the Engineer. The Contractor shall be responsible for seeing that the material is dumped in an orderly manner within the limits designated. The surface of the dump shall be neatly graded to blend with the natural contours of the existing ground surface. If the City or Drainage Board has no use for the surplus material, it will be the responsibility of the Contractor to properly dispose of said surplus.

3.04 BEDDING

A. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding 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. Bedding shall be placed evenly on each side of the pipe to mid diameter and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe.

B. Where the bottom of the excavation is not, in the opinion of the Engineer, of suitable material for the construction of required pipe foundation, the excavation shall be deepened and a limestone foundation shall be placed under the pipe as directed by the Engineer. This stone foundation is not to be included in the price bid for laying pipe and will be paid for as a separate item.

C. Where the Contractor exceeds the maximum trench width to the extent that excessive backfill loads are imposed on the pipe, or where the trench is over-excavated, as determined by the Engineer; the Contractor shall provide limestone or such additional pipe foundation as the Engineer may require without any additional compensation. Over-excavated trenches shall not be brought up to grade with excavated material.

3.05 MANHOLE INSTALLATION

A. Cast in place bases shall be constructed in a dry excavation on a six inch base of limestone foundation material compacted to 95% of the maximum density. Cast in place bases shall meet the requirements stated above. Concrete shall not be placed under water. Running water shall not be permitted over newly poured concrete. If base is cast-in-place, lowermost pre-cast unit shall be set in place at the time base is poured; additional precast units shall not be places until 24-hours after the base is poured. The excavation shall be kept dry until the concrete or mortar has developed sufficient strength to prevent rupture by groundwater pressure.

B. Precast bases sections shall be set on a level base of six inches of compacted (95% STP) No. 57 limestone, as shown in the Standard Details. Provisions shall be made to prevent flotation of the manhole.

C. Manhole inverts shall be formed as shown on the Drawings, either by laying pipe through and cutting out the top portion before completion of the base of the manholes, or by forming U-shaped channels in the concrete base section. Cut edges of pipe laid through the manhole shall be fully covered by 4000psi concrete when the manhole invert is complete. The finished invert shall be smooth and true to grade. No mortar or broken pieces of pipe shall be allowed to enter the sewers. Changes in direction of flow through the inlet shall be made to a true curve with as

large a radius as the size of the inlet will permit.

D. All lifting holes shall be plugged with Bentonite-Cement sealing plaster and sealed with a Miradri System patch, or approved equal, to a minimum of six inches from the edges of the opening, as required to prevent leakage.

E. After completion of the manhole, all plugs shall be completely removed from the sewers and all loose material shall be removed from the manhole.

F. Service connections shall not be installed into manholes unless otherwise shown on the Drawings or directed by the ENGINEER. Where service connections into manholes are allowed, the top of the service sewer pipe shall be 0.2 feet higher than the top of the downstream main sewer pipe. The manhole invert shall be channeled for the service connection sewers in the same manner as for main sewers.

G. Stubs for future construction shall consist of a section of pipe extending two feet outside the manhole wall, connected as shown on the Drawings and Standard Details. The manhole fillet shall be formed for future connection. The stubs shall be located as shown on the Drawings.

H. The top of manhole frame will be at the finished grade of pavement or at least 4-inches above the ground surface when not installed in pavement. In paved areas the frame and cover should match the slope and crown of the finished pavement.

I. Concrete riser rings shall be set in a full bed of mortar. Mortar shall be struck smooth on the inside of the manhole using a hard trowel followed by a sponge float. An epoxy system designed for metal-to-metal adhesion shall be used to connect individual cast iron riser rings and cast iron riser rings to the frame.

J. If inlet pipe enters the manhole two (2) feet above the manhole invert or higher, an internal or external drop line is required and shall comply with the drawings and Standard Details, unless otherwise stipulated by the City of Lake Charles Waste Water Department.

K. Exterior joints shall be sealed with an exterior joint waterproofing system and shall be installed as recommended by the system manufacturer.

L. The specified manhole interior lining system shall be FIELD APPLIED and shall be installed as recommended by the system manufacturer.

M. All manholes will be visually inspected by the ENGINEER; there shall be no evidence of leakage of water into any manhole from outside sources or any imperfections which may allow such leakage.

N. Manholes installed in pavement shall be provided with a cast-in-place concrete collar extending 1-foot out from the edge of the manhole rim.

O. Manholes located outside of paved surfaces shall be constructed to provide a rim elevation extending 3-inches above finished grade, including the sodded grass line.

P. Watertight manhole inserts shall be installed in all manholes, in accordance with manufacturer's

specifications, following the completion of the manhole installation.

3.06 PIPE INSTALLATION

A. Laying Pipe

1. All pipe shall be laid with the use of a laser. Pipe shall be laid in the trench on bedding or cradle as called for on the plans or as ordered by the Engineer. After the sewer is completed, the interior surface on the bottom thereof shall conform accurately to the grade and alignment indicated on the plans or directed by the Project Engineer. At any stage of construction of a straight stretch between any two consecutive manholes, the starting end of the pipe shall be clearly visible on looking through the pipe from the other end, with full cross section of the interior of the pipe in clear view. Any pipe which is not true in alignment or which has shown settlement after laying, shall be taken up and re-layed at the Contractor's expense.

2. Before being set in place, each section of pipe shall be thoroughly cleaned and freed of dirt. All bells shall be laid on the upstream end.

3. Whenever pipe laying is stopped, either for the night or for any other cause, the end of the pipe shall be securely closed to prevent the entrance of water, mud or other matter, and shall be secured in such manner as to prevent the pipe from being dislodged by movement of backfill. While pipe laying is in progress, the Contractor shall keep the trench clear of water.

4. Wye and tee branches shall be placed in the sewer lines at points indicated by the Engineer. Riser pipe and service lines shall be laid at points and to grades indicated by the Engineer. Riser pipe shall be encased in crushed limestone as shown on the plans. Service lines will be laid in accordance with the requirements for sewer pipe. The ends of all service lines and other points for future connections are to be capped with a suitable watertight cap as manufactured for use with the type of pipe being used.

B. Jointing Pipe and Fittings

3. Thoroughly clean the bell or coupling end and the plain end of the pipe and apply the joint lubricant liberally, shove the plain end of the pipe into the bell and coupling end of the pipe until the pipe hits the bevel of the bell, fitting or coupling.

C. Service Cleanouts

1. All sewer services shall be provided with a 6-inch clean-out and serve only one (1) building structure; combined sewer services shall not be allowed.

2. Cleanouts shall be constructed such that the frame shall be jointed to the riser pipe so that groundwater will be prevented from entering the sewer. Cleanouts shall be tested for water tightness along with the sewers to which they are connected.

3.07 CONNECTION TO EXISTING MANHOLE

A. CONTRACTOR shall remove or plug existing pipe as applicable, drill hole at new location required for installation of sewer under this contract, install pipe, seal the pipe penetration, form channeled inverts, install drop connections as required, and backfill as require.

B. Connection to existing manholes shall be made in such a manner that the modified manhole is equal to a new manhole in appearance and performance. A channel, approximately two inches larger all around than the connecting pipe, shall be cut into the existing manhole base. The new pipe shall be connected as shown on the Drawings and Standard Details. The rough-cut channel shall be finished to its final smooth and uniform shape with mortar. The existing sewer(s) shall be maintained in service and the fresh concrete and mortar surface shall be protected from the flowing sewage for a minimum of 24 hours.

C. Connections to existing manholes shall be plugged upon establishment, to dis-allow the flow of sanitary sewer into the City of Lake Charles' collection system, until the new system has been inspected and accepted by the City of Lake Charles Waste Water department. Under no circumstances shall the plug be removed by prior to the acceptance by City of Lake Charles.

3.08 BACKFILL

A. General

1. No backfilling of trenches shall be done until the pipe work to be covered has been inspected. Where any sheeting or bracing is withdrawn as backfilling progresses, all voids or spaces left thereby shall be carefully and thoroughly filled and compacted with proper tools.

2. The Engineer shall have the right to reject compaction methods and/or equipment, which do not produce satisfactory results.

3. Material for backfill shall contain no rubble, trash, broken concrete, asphalt or other objectionable materials.

4. All backfill operations shall be subject to the approval of the Engineer. The Contractor shall be responsible for the stability of all backfill made under the contract until one year after final acceptance of the work and shall bear the expense of replacing any portions which have become displaced due to carelessness or negligent work on the part of the Contractor or to damages, resulting from natural causes, such as storms, and not attributable, in the opinion of the Engineer, to unavoidable movements on the ground upon which the backfill is made.

5. Backfilling trenches for sewer pipes shall start as soon as the Engineer considers the joints to be satisfactory. Sand shall be carefully placed in six inch (6") layers in the trench so as not to move the pipe or dislodge any of the jointing material and thoroughly, but carefully compacted under or to the level as directed by the Engineer, and around the pipe to 12" over the top of the pipe. The utmost care shall be taken not to disturb the pipe by stepping on or near it or by throwing earth upon it from the bank above, or not to shift a pipe from its proper position by careless or unskilled ramming around it or by unequal filling on the sides.

6. Equal and similar care shall be exercised in filling up above the top of the sewer pipe.

B. Compaction

1. Where a trench is in a highway or city street right of way, backfill for the balance of the trench above a point one foot (1') above the top of the sewer shall be compacted by placing in layers of not more than eight inches (8") thickness and compacting with mechanical tampers or by any satisfactory method or methods that will obtain density hereinafter specified. The density of compacted material in each layer of backfill shall not be less than ninety percent (95%) of the maximum density as measured by Method A of AASHO Designation T-180 (Modified AASHO Test). The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures, which may be damaged as a result of backfill failure.

2. Where a trench is in open ground and not in a highway or street right of way, the balance of the trench above a point one foot (1') above the top of the sewer may be filled and compacted by approved equipment or mechanical tampers to obtain density equal to that of the adjacent undisturbed soil, and the surface mounded over the top to provide for some after-settlement. About two months after completion of this type of backfilling, the Contractor shall go over the trench again with a roller, refill to the surface of the ground, and re-roll or tamp to a satisfactory condition. The final surface shall be left in a condition equal to that originally found at the start of the work.

3. In those portions of the backfill which are adjacent to structures, or are for other reasons, inaccessible to the equipment used, the Contractor shall use mechanical tampers approved by the Engineer to obtain the specified density. Backfill shall be carefully placed so as to be equally distributed on all sides of the structure and so as not to damage the structure in any way.

4. Laboratory services for backfill density shall be performed by a commercial laboratory approved by the Engineer, but paid for by the Contractor. If settlement occurs the trenches shall be refilled, compacted, and made to conform to the original ground surface. The Contractor shall maintain the trenches in good and safe condition until final acceptance of work by the Owner, and he will be held responsible for any accident or damage to persons or property during the period of construction and for one year following the date of acceptance.

5. The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures which may be damaged as a result of backfill failure.

6. Pavement repair shall otherwise be in accordance with the City of Lake Charles Paving Specifications.

C. Clean-Up and Removal of Excess Materials

1. The Contractor shall not, without the permission of the Engineer, remove from the line of work any earth excavated therefrom which may be suitable for backfilling or

surfacing until the excavation has been refilled and surfaced.

2. As soon as the backfilling of any excavation is completed, the Contractor must at once begin the removal of all surplus dirt except that actually necessary to provide for the settlement of all filling unless otherwise provided in the Special Provisions. He shall also remove all pipe and other material placed or left on the street by him except material needed for the replacement of the paving. The street shall be opened up and made passable for traffic and the City of Lake Charles shall be notified in writing to that effect at once. Following the above work, the repairing and complete restoration of the street surface, bridges, crossing all places affected by the work shall be done as promptly as possible.

3.09 JACKING AND BORING

A. Where pipe lines are permitted or required to be jacked under roadways or other locations (with or without a sleeve pipe), the sleeve pipe or pipe line shall be installed by means of a boring machine or auger and hydraulic jack, or by other means satisfactory to the Engineer. In the event subsurface operation results in injury or damage to the pavement, repairs to this pavement shall be made by the Contractor at no additional cost to the owner. In the event the paving cracks on either side of the pipe line, or is otherwise disturbed or broken due to the Contractor's operations, he shall repair or replace same at his own expense without further compensation.

B. Where the boring location crosses a State or Federal highway, installation of the casing shall also be in accordance with all the requirements of the D.O.T.D. project permit issued for that location and the Contractor shall bid accordingly.

C. Any pipeline installed through a casing shall be installed according to manufacturer's recommendation, including, but not limited to, the following:

1. Pipe line properly supported on skid

2. Sand bedding of pipe line in casing

3. Properly sealing ends of casing pipe

3.10 TESTING

A. Pipe Testing

1. All pipe may be inspected and representative tests made at the place of manufacture by representatives of the City of Lake Charles to verify conformity with the specifications. A close check will be made for correct dimensions in the joint. Pipe may be inspected and tested prior to delivery to the site of the work and shall be checked for joint tolerances on the site prior to laying. The City of Lake Charles, at its discretion, may select at random any number lengths of pipe up to one length per hundred lengths from each run of pipe to the routine tests made under ASTM or AWWA specifications. The results of these special tests will be a prime factor in the acceptance or rejection of any given run of pipe.

B. Infiltration Testing

1. At no point in new sanitary sewer line shall the leakage of ground water into the system exceed an amount calculated on the basis of 250 gallons per day per mile per inch of diameter of sewer mains contributing at the flow at the point in question. THE FULL LENGTH OF ALL SEWER PIPE WILL BE TESTED FOR INFILTRATION.

C. Leakage Testing

1. After the line between manholes has been properly cleaned and backfilled, plugs shall be placed in either end of the line and inflated. Low-pressure air shall be introduced into the sealed line to a pressure of 4 psig and allowed to stabilize (a minimum of two [2] minutes) to a minimum pressure of 3.5 psig. If the time required to drop the air pressure to 2.5 psig is less than the time scheduled as follows for the various diameters, then the test has failed. The test may be concluded if the pressure does not fall to 2.5 psig in the time scheduled.

2. Minimum holding time required for pressure to drop from 3.5 psig to 2.5 psig shall be 10 min. for 12” and 4 min. for 8” diameter sewer pipe.

3. If the ground water table is above the top of the sewer pipe, the test pressure shall be adjusted upward to give a net pressure differential of 3.5 psig.

4. Any obvious excessive leaks in the system shall be repaired immediately upon discovery. Costs for repairing faulty work, including re-excavating and re-backfilling and for making tests, shall be included in the price bid for installing sewers.

D. Deflection Testing

1. Pipe shall not exceed a deflection of more than 5%. After pipe has been backfilled for at least 30 days, a mandrel sized at 95% of the inside pipe diameter shall be pulled through pipe for verification testing.

E. Manhole Testing

1. At least 25% of the completed manholes, as selected by the ENGINEER, shall be tested for water-tightness by the CONTRACTOR. The test shall be made, with all connecting pipes plugged, by filling the manhole with clean water to within two inches of the bottom of the cast iron frame. The leakage rate shall not exceed three gallons per day per foot of depth, or fifty gallons per day, whichever is less, over a test period of not less than two hours when the water table is not an adverse factor. For every manhole that fails to meet the test, four additional manholes shall be tested.

2. If the water table is an adverse factor, the manhole shall be pumped completely dry, all pipes plugged, and then be checked for infiltration. The leakage rate shall not exceed three gallons per day per foot of depth, or fifty gallons per day, whichever is less, over a test period of not less than two hours.

3. The CONTRACTOR shall repair all imperfections and leaks disclosed by either visual

inspection or testing. The method of repair shall be subject to the ENGINEER's approval.

END OF SECTION

SECTION 2
SANITARY SEWER FORCEMAINS

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing labor, materials and services for the construction of a sanitary sewer forcemain and shall consist of furnishing and installing sanitary sewer forcemain pipe and appurtenances, in accordance with these specifications, and in conformity with the lines and grades shown on the plans or established by the Engineer. This item includes furnishing and transporting materials, excavating, bracing, bedding, dewatering, laying, jointing, testing, backfilling, and surface cleanup.

B. Tracer wire shall be provided along the entire length of the forcemain as further detailed herein.

C. All Sanitary Sewer forcemains shall be designed such that the absolute minimum extents of the forcemain are to be installed beneath paved surfaces. The City of Lake Charles Waste Water Department reserves the right to grant waivers on the basis of special conditions; however, no sanitary sewer forcemain designed completely beneath the paved surfaces will be accepted.

1.02 REFERENCES

A. All materials, designs, and construction shall conform to the latest revisions of the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI)
3. Concrete Reinforcing Steel Institute (CRSI)
4. American National Standards Institute (ANSI)
5. American Water Works Association (AWWA)
6. The Society for Protective Coatings (SSPC)
7. National Sanitation Foundation (NSF)

1.03 SUBMITTALS

A. Submittals shall be made available to the City of Lake Charles Wastewater Division at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Wastewater Division for approval prior to acceptance of the sanitary sewer system. Project

record documents shall accurately record locations of pipe runs, service connections, manholes, and invert elevation within rights-of-way or permanent easements.

C. The same manufacturer shall supply all like materials and equipment of the same class, unless specified to the contrary. They shall be new, free from defects.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the sanitary sewer forcemain must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications established by the Wastewater Division;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located within acceptable rights-of-way or readily accessible maintenance easements to be granted to the City;

6. Accurately depicted in record documents to be submitted.

1.05 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the Owner within the guarantee period.

PART 2 PRODUCTS

2.01 GENERAL

A. Where a certain pipe material is specified on the plans, only that material can be used. All materials shall be new and in good condition.

B. Sample of pipe and physical and chemical data sheets shall be submitted to the Engineer for approval, and his approval shall be obtained before pipe is purchased.

C. The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects.

D. At the option of the owner, manufacturers may be disqualified if they do not have proper

experience in the manufacture of the material specified.

2.02 SANITARY SEWER FORCEMAIN PIPE

A. Polyvinyl Chloride (PVC) Pipe:

1. Pipe (diameters 4-inch through 12-inch): AWWA C900, SDR 18, 235 psi pressure, NSF approved, 12454 B PVC compound conforming to ASTM Resin Specification D1784.

2. Pipe (diameters 14-inch through 24-inch): AWWA C905, SDR18 DIPS, 235 psi rating, NSF approved, 12454 B PVC compound conforming to ASTM Resin Specification D1784.

3. Pipe shall be new, homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties.

4. All pipe shall be suitable for use as pressure conduit. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a locked-in, solid cross section elastomeric ring which meets the requirements of ASTM A3139 and ASTM F477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C900. Installation shall be according to manufacturer's specifications.

5. All PVC pipe joints located within the limits of restrained joint sections, as well as those joints underneath existing or proposed pavement, shall be provided with restraining harnesses or approved integral restrained push on joints. Restraint harnesses shall be Series 2800 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal.

6. PVC pipe shall be supplied in standard nominal laying lengths of 20 feet. The color of pipe shall be green. The pipe shall be marked with the size, material code, dimension ratio (DR), AWWA pressure class and AWWA designation.

7. Fittings for PVC pipe shall be ductile iron and conform to Section 2.03.

B. Ductile Iron (DI) Pipe

1. Pipe shall be designed in accordance with ANSI Specification A21.50 (AWWA C-150) for 150 psi working pressure. Ductile iron pipe shall have a minimum tensile strength of 60,000 psi with minimum yield strength of 42,000 psi (per AWWA M-41). Design shall be done for external and internal pressures separately using the larger of the two for the net design thickness. Additional allowances shall be made for service allowance and casting tolerance per AWWA C150. Pipe shall be manufactured in accordance with ANSI Specification A21.51 (AWWA C-151), latest revision.

2. The pipe interior shall be ceramic epoxy lined. The ceramic epoxy lining shall be a two component amine cured novalac epoxy of at least 87 percent solids. Lining material shall

be Protecto 401 by Induron Coatings, Birmingham, AL, or prior approved equal, and shall be installed in accordance with the manufacturer's recommendations, but not less than a 40 mil DFT.

3. The exterior of the pipe shall be coated, with an asphaltic coating 3 mil minimum thickness in accordance with ANSI Specification A21.51 (AWWA C151), latest revision.

4. All ductile iron pipe shall be installed with polyethylene encasement conforming to AWWA C105, installed in accordance with the manufacturer's recommendations. Film shall be Class C-Black, minimum thickness of 0.008 inches (8 mils), and furnish a certificate of conformance of the material to the requirement of AWWA C105.

5. UNRESTRAINED PIPE JOINTS: Ductile iron pipe joints shall be push-on rubber gasket type or rubber-gasket mechanical joint per AWWA C111 in unrestrained applications. Unrestrained pipe joints shall be by one of the following or an approved equal:

   a. "Tyton Joint Pipe" by US Pipe and Foundry Company.

   b. "Fastite Joint Pipe" by the American Cast Iron Pipe Company.

   c. "Tyton Joint Pipe" or "Fastite Joint Pipe" by McWane Company.

6. RESTRAINED PIPE JOINTS: All ductile iron pipe joints located within the limits of restrained joint sections shall be provided with restraining harnesses or approved integral restrained push on joints. Location of restrained joints shall be subject to the approval of the Engineer and direct payment will be made per each restrained joint, regardless of the method of restraint. Restraints for ductile iron pipe joints shall be push on rubber gasket with integral proprietary restrained joint or a mechanical restraint harness manufactured for ductile iron push on joint pipe. Restraint harnesses shall be Series 1700 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal. Restrained push on joints shall be by one of the following or an approved equal:

   a. "TR Flex" or "HP Lock" by US Pipe and Foundry Company.

   b. "Flex Ring (positive locking style)" by the American Cast Iron Pipe Company.

   c. "TR Flex" by McWane Company.

7. Fittings for ductile iron pipe shall be ductile iron and conform to Section 2.03.

8. Ductile iron pipe shall be manufactured in the United States by American Cast Iron Pipe Company, McWane Company, U.S. Pipe and Foundry Company, or approved equal.

C. High Density Polyethylene Pipe (HDPE Pipe):

1. HDPE Pipe shall be AWWA C906, DIPS, SDR11, PE 3408 High Density, DIPS, Cell Classification 345434C, in accordance with ASTM D3350.

2. HDPE sewer force main pipe shall have a green colored stripe along the entire exterior length of the pipe.

3. Transition Fittings shall be a mechanical joint adapter (Harvey Adapter) fabricated from HDPE pipe conforming to ASTM 3350. The adapter shall have a pre-positioned stainless steel stiffener and shall offer full axial restraint, by means of a restraining gland.

4. Butt-fusion of pipes and fittings shall be performed in accordance with the pipe manufacturer's recommendations as to equipment and technique. Fusion shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.

5. Fittings for HDPE pipe shall be ductile iron and conform to Section 2.03.

2.03 FITTINGS

A. Mechanical joint ductile Iron fittings shall be used for HDPE, PVC, and Ductile Iron Forcemains downstream of the valve vault.

B. Ductile iron fittings shall be standard body ANSI A21.10/AWWA C110 or compact body ANSI A21.53/AWWA C153, as required by the construction documents. The rated working pressure shall be 350 psi for 24-inch and smaller and 250 psi for 30-in and larger.

C. The fitting interior shall be ceramic epoxy lined. The ceramic epoxy lining shall be a two component amine cured novalac epoxy of at least 87 percent solids. Lining material shall be Protecto 401 by Induron Coatings, Birmingham, AL, or prior approved equal, and shall be installed in accordance with the manufacturer's recommendations, but not less than a 40 mil DFT.

D. The exterior of the fitting shall be coated, with an asphaltic coating 3 mil minimum thickness in accordance with ANSI Specification A21.51 (AWWA C151), latest revision.

E. All mechanical joint fittings shall be installed with restraining glands in addition to concrete thrust blocks. Restraining glands shall be Series 1300C by Uniflange; Megalug Series 1100 PV or Series 2000PV by EBAA Iron Sales, Inc, or approved equal.

F. All ductile iron fittings shall be installed with polyethylene encasement conforming AWWA C105, installed in accordance with the manufacturer's recommendations. Film shall be Class C-Black, minimum thickness of 0.008 inches (8 mils), and furnish a certificate of conformance of the material to the requirement of AWWA C105.

G. Bolts and nuts shall be alloy steel (Corten Type).

3.03 RESTRAINT HARNESS

A. All pipe joints located within the limits of restrained joint sections shall be provided with restraining harnesses or approved integral restrained push on joints. Location of restrained joints shall be subject to the approval of the Engineer. Restraints for joints shall be push on

rubber gasket with integral proprietary restrained joint or a mechanical restraint harness manufactured for push on joint pipe. Restraint harnesses shall be Series 1700 or Series 2800 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal.

B. Bolts and nuts shall be alloy steel (Corten Type).

2.05 CASING FOR JACKING AND BORING

A. Unless otherwise required by the agency having jurisdiction, the casing shall be welded steel pipe meeting ASTM A53, Grade B, and have a minimum yield strength of 35,000 psi. The exterior of the casing pipe shall be coated with coal tar epoxy or bituminous asphalt. Minimum wall thickness shall be as shown in the following table:

Table for minimum wall thickness for steel casing pipe for E72 loading		
Carrier Pipe Nominal Diameter (inches)	Min. Casing Pipe Diameter (O.D.) (inches)	Nominal Thickness (inches)
6	12	0.344
8	16	0.375
10	20	0.407
12	24	0.469
14	27	0.505
16	30	0.505
18	30	0.505
20	36	0.595
24	36	0.595
30	42	0.625
36	48	0.688
42	60	0.844

2.06 TRACER WIRE

A. Tracer wire for horizontal directional drilling operations shall be 8 gauge, Copper Clad Steel, extruded with a 45 mil (minimum) HDPE coating, .219 inches (minimum) O.D. Rated break load 2,785 lbs., 30 volt, 21% IACS. The outside color of the wire shall meet the APWA color code of the buried utility line. Tracer wire shall be Pro-Trace HDD-CCS PE45 as manufactured by Pro-Line Safety Products Co., or Engineer approved equal.

B. Tracer wire for direct bury shall be 8 gauge, Copper Clad Steel, extruded with a 45 mil (minimum) HDPE coating, .219 inches (minimum) O.D. Rated break load 713 lbs., 30 volt, 21% IACS. The outside color of the wire shall meet the APWA color code of the buried utility line. Tracer wire shall be Pro-Trace HF-CCS PE45 as manufactured by Pro-Line Safety Products Co., or Engineer approved equal.

C. The wire shall be held in place by tacking it to the top of the pipe using duct tape at approx. 10 foot centers and shall be continuous for the entire length of the water line. Sufficient slack shall be provided at each valve location in order that the wire can be pulled up into the valve box for easy access.

D. Attach wire to all fixtures and appurtenances to ensure continuous flow of electrical current.

E. Splices in detection wire shall be installed per the manufacturer's directions.

2.07 COUPLINGS

A. Sleeve type couplings shall be Dresser Style 38, 138 or equal.

2.08 CONCRETE

A. Concrete for thrust blocks and pads shall be 3000 psi at twenty eight (28) days. Concrete shall be ready mix; not Sakrete.

2.09 WATERTIGHT CONNECTORS

A. Connectors shall meet ASTM C923, shall be KOR-N-SEAL flexible watertight connectors as manufactured by NPL Systems, Inc., or approved equal.

2.10 COMBINATION AIR VALVES

A. Combination air valves shall be installed on high points along the forcemain length, as well as, those locations, where in the opinion of the Engineer air may become trapped in the forcemain.

B. Combination air valves shall be of the size specified by the Engineer and shall be as manufactured ARI, Golden Anderson, or approved equal.

C. Air Valves shall be installed in a Pre-Cast Concrete manhole in accordance with the City of Lake Charles specifications for concrete manholes, or similar structure approved by the City of Lake Charles Waste Water Department. The concrete structure shall be lined with a multi-component stress panel interior lining system.

2.11 FOUNDATION, BEDDING, AND BACKFILL MATERIAL

A. Foundation Material

1. Crushed limestone or crushed Portland cement concrete shall be used for structure foundations and pipe foundation amendments as detailed herein. Crushed limestone or crushed Portland Cement Concrete foundation material shall meet the following #610 gradations.

Sieve Size	**Percent Finer By Weight**
1 – ½ in	100
1 - in	90 to 100
3/4 - in	70 to 95
3/8 - in	50 to 80
No. 4	35 to 65
No. 10	25 to 50
No. 40	10 to 26
No. 200	4 to 12

B. Bedding and Embedment Material

a. Sand shall be used for bedding and initial backfill of the forcemain as further detailed herein. Sand for embedment shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	Percent Finer By Weight
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

C. Backfill Materials

1. Usable Native Excavated Soils shall be used for trench back fill when the entirety of the trench is located more than five (5) feet from the edge of the roadway or paved surface. Usable native excavated materials shall meet the following requirements.

a. Usable native excavated soils shall have a maximum PI of 25 and maximum organic content of five (5) percent. Soils with a silt content of fifty (50) percent or greater and also a PI of ten (10) or less will not be allowed. Any select material used to supplement or replace usable excavated soil shall meet these requirements and must be approved by the Engineer. Soil shall be tested at the Engineer and the Owner's option. Usable excavated material may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Owner's access nor inconvenience traffic adjoining property owners.

b. When excavated soils do not meet the above stated requirements they shall be removed from the site, at the contractors expense, and replaced with Select or Sand Backfill Material.

2. Select or Sand Backfill Material shall be used for trench backfill when any portion of the trench is to be installed within five (5) feet from the edge of the roadway or paved surface.

a. Sand for backfilling trenches and structures shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	Percent Finer By Weight
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

b. Select backfill material shall be natural soils with a maximum PI of 20, maximum Liquid Limit of 35, and a maximum organic content of 5 percent. Soils with a silt content of 50 percent or greater and also a PI of 10 or less shall not be allowed.

3. Crushed limestone or Crushed Portland Cement Concrete Backfill

a. Crushed limestone or crushed Portland Cement Concrete backfill material shall be used for trench backfill when the trench is to be installed beneath any paved surface, or as directed by the Engineer. Crushed limestone or crushed Portland Cement Concrete backfill material shall meet the requirements set forth above for Foundation material.

PART 3 EXECUTION

3.01 GENERAL

A. Coordinate with other utility providers to the fullest extent possible complete maximum spacing from all utilities for ease of access.

B. Forcemains shall be installed with wall to wall clear separations of not less than 6-feet horizontally and 18-inches vertically from potable water lines. Where these separations are not able to be met, the line shall be encased in concrete.

C. Any materials damaged during installation shall be removed and discarded.

3.02 ALIGNMENT AND GRADE

A. The contractor shall use a chalk line to assist in alignment of the pipe line.

B. Whenever obstructions not shown on the plans are encountered, and the Engineer deems it necessary to change alignment to expedite the work, if the change in plans result in a change of the amount of work by the Contractor, such altered work will be allowed the Contractor on the basis of bid unit prices or extra work order, whichever the case may be.

C. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part. Unless specifically ordered by the Engineer, the minimum coverage of this pipe line shall be forty-eight inches (48").

3.03 TRENCHING AND EXCAVATION

A. Excavation

1. Excavation shall include the removal, handling, re-handling, refill or backfilling, and disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing, and trench box. The work of excavation shall also include the responsibility of added expenses or other liability that may arise from quicksand, obstacles or conditions, foreseen or unforeseen, which may be encountered in the work. It includes clearing and the removal of pavements, curbs, sidewalks, shrubbery, and other obstructions not otherwise provided for.

B. Lines of Excavation

1. The trench shall be dug so that the pipe can be laid to the alignment and depth required and it shall be excavated no more than 500 feet in advance of pipe laying. All excavation shall be made in such manner and to such widths as will give ample room for properly installing and inspecting the piping. All excavation necessary for laying pipe, constructing manholes, etc., shall be made to line and grade as indicated on the plans and as specified herein. Trenches shall be dug to the alignment and depth required and only so far ahead of the pipe laying as the Engineer will permit. The trench shall be braced and drained as may be required so that workmen may work therein safely and efficiently. A trench box may be used in lieu of sheeting and shoring.

2. Bottoms of trenches shall be excavated and formed to provide for pipe bedding or pipe foundations as hereinafter specified or as required by the plans or Special Provisions.

3. Bell holes, where necessary to make up the joints, shall be dug of sufficient size that the whole length of the pipe barrel be bedded as required, and to allow all of the joints to be properly made.

4. All excavation shall be open cuts with vertical sides except in special cases where the Engineer may permit sloping sides above a point two feet (2') above the top of the pipe, or except where tunneling is permitted or required.

5. If tunnels are authorized or required, they shall be only as large as necessary for the installation of the pipe and as approved by the Engineer or as detailed on the plans.

6. The maximum width of trench or sewer pipe installation at a point two feet (2') above the top of the pipe shall be the external diameter of the barrel of the pipe plus nine inches (9") on each side of the pipe.

C. Methods of Excavation

1. The Engineer shall have the authority, at any time, to require the Contractor to discontinue the use of any excavating machine or other appliance which, in the Engineer's judgment, is not adapted to the purpose for which it is used.

D. Dewatering

1. The trenches shall be maintained free of water at all times while work is in progress, and water shall not be allowed to flow over or rise upon earth foundations, pipe, concrete masonry, or other work, except as otherwise specified for bayou crossings and special "wet areas." The Contractor shall not open more trench than the available pumping facilities can dewater to the satisfaction of the Engineer.

2. The Contractor shall assume all responsibility for disposing of all water so as not to injure or interfere with normal drainage of the locality. In no case shall water pipe lines be used as drains for such water. The ends of water pipe lines shall be adequately and properly plugged during construction by the use of approved stoppers (a garbage bag is not an approved stopper), and all necessary precautions shall be taken to prevent the entrance of ground water, mud, sand, or any other objectionable materials into the pipe

lines. If such materials enter the pipe lines, they shall be removed by the Contractor as soon as possible after discovery thereof.

3. The Contractor shall use due vigilance and care so that no water originating on his work or due to his work or which he is obligated to handle and dispose of under this contract shall discharge or be discharged on the work or into the trenches of another contractor unless a mutual agreement by the parties affected has been reached. Nothing in this section is to be construed as preventing the reasonable use by the Contractor of any ditch, channel, storm drain, or gutter which is designated and used for City or Parish drainage.

E. Maintenance of Excavation

1. The Contractor shall maintain all excavation in good order during the construction, so as not to hinder or injure the pipe laying, masonry, or other work. He shall take all reasonable precautions to prevent movement of the sides of such excavation, and shall remove at his own expense any material sliding into the excavation.

F. Sheeting and Bracing

1. The Contractor shall furnish and put in place such sheeting and bracing as may be required to support the sides of all trenches or other excavations and, where required, remove, or cut off, as directed, such sheeting at his own expense. A steel trench box, supplemented with additional sheeting, may be used in lieu of total sheeting and bracing.

G. Disposal of Excavated Material

1. All material excavated shall be placed so as to interfere as little as possible with public travel. In case the street is not wide enough to allow the dirt to be piled up without blocking the sidewalk, the Contractor shall, at his own expense, maintain an open passageway not less than two and one-half feet (2 ½') wide on the sidewalk and shall keep this passageway free from mud and slush.

2. The Contractor may deposit excavated materials directly in permanent position insofar as is consistent with the proper prosecution of the work. Materials that cannot be placed at once in permanent position shall be deposited in temporary storage piles. All this work shall be done with reasonable neatness and excavated materials shall not be carelessly strewn over the area.

3. Surplus excavated material over and above that required for backfilling, mounding over the pipe and making other fills and embankments to the finished lines and grades indicated on the drawings shall be disposed of as directed by the Engineer. The Contractor shall be responsible for seeing that the material is dumped in an orderly manner within the limits designated. The surface of the dump shall be neatly graded to blend with the natural contours of the existing ground surface. If the City or Drainage Board has no use for the surplus material, it will be the responsibility of the Contractor to properly dispose of said surplus.

3.04 BEDDING

A. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding 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. Bedding shall be placed evenly on each side of the pipe to mid diameter and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe.

B. Where the bottom of the excavation is not, in the opinion of the Engineer, of suitable material for the construction of required pipe foundation, the excavation shall be deepened and a limestone foundation shall be placed under the pipe as directed by the Engineer. This stone foundation is not to be included in the price bid for laying pipe and will be paid for as a separate item.

C. Where the Contractor exceeds the maximum trench width to the extent that excessive backfill loads are imposed on the pipe, or where the trench is over-excavated, as determined by the Engineer; the Contractor shall provide limestone or such additional pipe foundation as the Engineer may require without any additional compensation. Over-excavated trenches shall not be brought up to grade with excavated material.

3.05 PIPE INSTALLATION

A. The pipe shall be installed on a uniform pipe foundation over its entire length.

B. Thoroughly clean the bell or coupling end and the plain end of the pipe and apply the joint lubricant liberally, shove the plain end of the pipe into the bell and coupling end of the pipe until the pipe hits the bevel of the bell, fitting or coupling.

C. When work is not in progress, the ends of the pipe and fittings shall be plugged so foreign material cannot enter pipe.

D. Provide bell holes at each joint to permit proper joint assembly and uniform pipe support.

E. The pipe shall be installed and backfilled in accordance with the manufacturer's specifications. Items of work not mentioned specifically herein shall be performed in compliance with the current revision of AWWA C605, AWWA C600, and AWWA M55.

F. The trench shall provide continuous support for the pipe without voids or soft spots under the pipe.

G. Concrete thrust block, as well as, restraining glands shall be provided at all fittings where a change of direction occurs or as specified by the Engineer for all pipe three (3") in diameter or greater. Thrust blocks shall be poured against undisturbed soil and shall not cover the bolts or nuts on the fittings. A plastic barrier shall protect bolts or nuts from being covered.

H. Pipe shall be laid beneath all ditches, sewers, culverts, pipes, conduits, drainage canals, tracks and similar structures. Regular pipe laying methods shall be used in all such cases except where special crossings are indicated.

I. High points in the forcemain shall me minimized during the course of the installation. Where high points cannot be avoided or are the product of obstruction crossings, combination air valves shall be installed in these locations.

3.06 AIR VALVE INSTALLATION

A. Air Valves shall be installed in a Pre-Cast Concrete manhole in accordance with the City of Lake Charles specifications for concrete manholes, or similar structure approved by the City of Lake Charles Waste Water Department. The concrete structure shall be lined with a multi-component stress panel interior lining system.

B. The air valve shall be installed in accordance with the manufacturer's printed instructions.

C. The air valve shall be oriented in the vault for easy access and maintenance.

D. The manhole shall be installed on a foundation of 6-inches of No. 57 Limestone.

3.07 LEAKAGE TESTING:

A. All pipe lines shall be hydrostatically tested as specified herein and as otherwise required to demonstrate that they will successfully withstand 100 psi operating pressure without leakage in excess of the specified maximum in any test section of the pipe line, all as approved by the Engineer.

B. For leakage tests of pipe lines the air shall be completely expelled from the section of pipe line to be tested, and the test shall be made at a hydrostatic pressure of not less than 100 psi for a duration of not less than two (2) hours, during which the leakage shall not exceed one (1) gallon per inch of nominal diameter per mile of pipe per hour. In all cases, the test period shall be of sufficient duration to permit proper examination of pipe joints and other items in the test section of pipe line.

C. All pipe, joints, fittings, valves, and other items found to be cracked, leaking or otherwise defective, shall be removed and replaced, and the pipe lines shall be retested until the test requirements have been complied with.

3.08 BACKFILL

A. General

1. No backfilling of trenches shall be done until the pipe work to be covered has been inspected. Where any sheeting or bracing is withdrawn as backfilling progresses, all voids or spaces left thereby shall be carefully and thoroughly filled and compacted with proper tools.

2. The Engineer shall have the right to reject compaction methods and/or equipment, which do not produce satisfactory results.

3. Material for backfill shall contain no rubble, trash, broken concrete, asphalt or other objectionable materials.

4. All backfill operations shall be subject to the approval of the Engineer. The Contractor shall be responsible for the stability of all backfill made under the contract until one year after final acceptance of the work and shall bear the expense of replacing any portions which have become displaced due to carelessness or negligent work on the part of the Contractor or to damages, resulting from natural causes, such as storms, and not attributable, in the opinion of the Engineer, to unavoidable movements on the ground upon which the backfill is made.

5. Backfilling trenches for sewer pipes shall start as soon as the Engineer considers the joints to be satisfactory. Sand shall be carefully placed in six inch (6") layers in the trench so as not to move the pipe or dislodge any of the jointing material and thoroughly, but carefully compacted under or to the level as directed by the Engineer, and around the pipe to 12" over the top of the pipe. The utmost care shall be taken not to disturb the pipe by stepping on or near it or by throwing earth upon it from the bank above, or not to shift a pipe from its proper position by careless or unskilled ramming around it or by unequal filling on the sides.

6. Equal and similar care shall be exercised in filling up above the top of the sewer pipe.

B. Compaction

1. Where a trench is in a highway or city street right of way, backfill for the balance of the trench above a point one foot (1') above the top of the sewer shall be compacted by placing in layers of not more than eight inches (8") thickness and compacting with mechanical tampers or by any satisfactory method or methods that will obtain density hereinafter specified. The density of compacted material in each layer of backfill shall not be less than ninety percent (95%) of the maximum density as measured by Method A of AASHO Designation T-180 (Modified AASHO Test). The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures, which may be damaged as a result of backfill failure.

2. Where a trench is in open ground and not in a highway or street right of way, the balance of the trench above a point one foot (1') above the top of the sewer may be filled and compacted by approved equipment or mechanical tampers to obtain density equal to that of the adjacent undisturbed soil, and the surface mounded over the top to provide for some after-settlement. About two months after completion of this type of backfilling, the Contractor shall go over the trench again with a roller, refill to the surface of the ground, and re-roll or tamp to a satisfactory condition. The final surface shall be left in a condition equal to that originally found at the start of the work.

3. In those portions of the backfill which are adjacent to structures, or are for other reasons, inaccessible to the equipment used, the Contractor shall use mechanical tampers approved by the Engineer to obtain the specified density. Backfill shall be carefully placed so as to be equally distributed on all sides of the structure and so as not to damage the structure in any way.

4. Laboratory services for backfill density shall be performed by a commercial laboratory

approved by the Engineer, but paid for by the Contractor. If settlement occurs the trenches shall be refilled, compacted, and made to conform to the original ground surface. The Contractor shall maintain the trenches in good and safe condition until final acceptance of work by the Owner, and he will be held responsible for any accident or damage to persons or property during the period of construction and for one year following the date of acceptance.

5. The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures which may be damaged as a result of backfill failure.

6. Pavement repair shall otherwise be in accordance with the City of Lake Charles Paving Specifications.

C. Clean-Up and Removal of Excess Materials

1. The Contractor shall not, without the permission of the Engineer, remove from the line of work any earth excavated therefrom which may be suitable for backfilling or surfacing until the excavation has been refilled and surfaced.

2. As soon as the backfilling of any excavation is completed, the Contractor must at once begin the removal of all surplus dirt except that actually necessary to provide for the settlement of all filling unless otherwise provided in the Special Provisions. He shall also remove all pipe and other material placed or left on the street by him except material needed for the replacement of the paving. The street shall be opened up and made passable for traffic and the City of Lake Charles shall be notified in writing to that effect at once. Following the above work, the repairing and complete restoration of the street surface, bridges, crossing all places affected by the work shall be done as promptly as possible.

3.09 JACKING AND BORING

A. Where pipe lines are permitted or required to be jacked under roadways or other locations (with or without a sleeve pipe), the sleeve pipe or pipe line shall be installed by means of a boring machine or auger and hydraulic jack, or by other means satisfactory to the Engineer. In the event subsurface operation results in injury or damage to the pavement, repairs to this pavement shall be made by the Contractor at no additional cost to the owner. In the event the paving cracks on either side of the pipe line, or is otherwise disturbed or broken due to the Contractor's operations, he shall repair or replace same at his own expense without further compensation.

B. Where the boring location crosses a State or Federal highway, installation of the casing shall also be in accordance with all the requirements of the D.O.T.D. project permit issued for that location, and the Contractor shall bid accordingly.

C. Any pipeline installed through a casing shall be installed according to manufacturer's recommendation, including, but not limited to, the following:

1. Pipe line properly supported on skid

2. Sand bedding of pipe line in casing

3. Properly sealing ends of casing pipe

3.10 DIRECTIONAL DRILLING

A. The drilling shall be performed by a company with sufficient experience and expertise to perform the work in conformance with the drawings and these specifications. The contractor is responsible for all cleanup and disposal of debris, cuttings, soil, etc. and shall perform this portion of the work in an environmentally sound manner.

B. The Contractor shall clean up and dispose of excess drilling mud associated with the boring process. The mud shall be disposed of in a timely manner. All driveways, pavement, and walkways shall be cleaned at the end of each day. Excess mud in the roadside ditches shall be managed so as not to block drainage during the process of the work. This cleanup shall proceed with the work and not be left for the end of the project.

3.11 FORCEMAIN CONNECTIONS TO MANHOLES

A. Connect force main to manholes at locations indicated on the Drawings.

B. Provide watertight connector at force main tie-in.

C. The interior lining of existing receiving manhole shall be repaired per the manufacturers' recommendations. The interior of all new receiving manholes shall be lined with a multi-component stress panel interior liner system. Receiving manholes currently not installed with the specified lining system, shall be lined at the expense of the Contractor.

END OF SECTION

SECTION 3
WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing labor, materials and services for the construction of water distribution lines complete with all necessary pipe, fittings, adapters, valves, valve boxes, thrust blocks, fire hydrants, service connections, meter boxes, complete and operable, pressure tested and disinfected. The requirements of these specifications shall govern any proposed connections to existing water infrastructure owned and operated by the City of Lake Charles. All work shall be in accordance with requirements of the Owner and Engineer. This item includes furnishing and transporting materials, excavating, bracing, bedding, dewatering, laying, jointing, testing, backfilling, and surface cleanup.

B. All distribution systems shall be designed such that the absolute minimum extents of the distribution system are to be installed beneath paved surfaces. The City of Lake Charles Water Department reserves the right to grant waivers on the basis of special conditions; however, no water distribution system designed completely beneath the paved surfaces will be accepted. Any and all joints and fittings installed beneath paved services shall be fully restrained.

C. Tracer wire shall be provided along the entire length of the water main, as well as all service lines, as further detailed herein.

1.02 REFERENCES

A. All materials and designs shall conform to the requirements of these specifications. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. Louisiana Department of Health (LDH)
2. American Society for Testing and Materials (ASTM)
3. American Concrete Institute (ACI)
4. Concrete Reinforcing Steel Institute (CRSI)
5. American National Standards Institute (ANSI)
6. American Water Works Association (AWWA)

B. The same manufacturer shall supply all like materials and equipment of the same class, unless specified to the contrary.

1.03 SUBMITTALS

A. Submittals shall be made available to the City of Lake Charles Water Division during at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Water Division for approval prior to acceptance of the water distribution system. Project record documents shall accurately record locations of pipe runs, service connections, isolation valves, and air release valves.

1.04 ACCEPTANCE

A. For acceptance of the by the City of Lake Charles, the water distribution system must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications established by the Water Division;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located on acceptable rights-of-way or readily accessible maintenance easements to be granted to the City.

6. Accurately depicted in record documents to be submitted

1.06 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the Owner within the guarantee period.

PART 2 PRODUCTS

2.01 GENERAL

A. Where a certain pipe material is specified on the plans, only that material can be used. All materials shall be new and in good condition.

B. No water distribution line shall be less than 8-inches in diameter.

C. No water service line shall be less than 1-inch in diameter. All water service taps to the main shall service a single residence, or a single building with no interconnectivity.

2.02 WATER DISTRIBUTION PIPE

A. Polyvinyl Chloride (PVC) Pipe

1. Pipe (diameters 4-inch through 12-inch): AWWA C900, SDR 18, 235 psi pressure, NSF approved, 12454 B PVC compound conforming to ASTM Resin Specification D1784.

2. Pipe (diameters 14-inch through 24-inch): AWWA C905, SDR18 DIPS, 235 psi rating, NSF approved, 12454 B PVC compound conforming to ASTM Resin Specification D1784.

3. Pipe shall be new, homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties.

4. All pipe shall be suitable for use as pressure conduit. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a locked-in, solid cross section elastomeric ring which meets the requirements of ASTM A3139 and ASTM F477. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C900. Installation shall be according to manufacturer's specifications.

5. All PVC pipe joints located within the limits of restrained joint sections, as well as those joints underneath existing or proposed pavement, shall be provided with restraining harnesses or approved integral restrained push on joints. Restraint harnesses shall be Series 2800 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal.

6. PVC pipe shall be supplied in standard nominal laying lengths of 20 feet. The color of pipe shall be blue. The pipe shall be marked with the size, material code, dimension ratio (DR), AWWA pressure class and AWWA designation.

7. Fittings for PVC pipe shall be ductile iron and conform to Section 2.03.

B. Ductile Iron (DI) Pipe

1. Pipe shall be designed in accordance with ANSI Specification A21.50 (AWWA C-150) for 150 psi working pressure. Ductile iron pipe shall have a minimum tensile strength of 60,000 psi with minimum yield strength of 42,000 psi (per AWWA M-41). Design shall be done for external and internal pressures separately using the larger of the two for the net design thickness. Additional allowances shall be made for service allowance and casting tolerance per AWWA C150. Pipe shall be manufactured in accordance with ANSI Specification A21.51 (AWWA C-151), latest revision.

2. The pipe interior shall be standard cement lined and seal coated with an asphaltic coating in accordance with ANSI Specification A21.4 (AWWA C104) and ANSI A21.16, latest revision.

3. The exterior of the pipe shall be coated, with an asphaltic coating 3 mil minimum thickness in accordance with ANSI Specification A21.51 (AWWA C151), latest revision.

4. All ductile iron pipe shall be installed with polyethylene encasement conforming to AWWA C105, installed in accordance with the manufacturer's recommendations. Film shall be Class C-Black, minimum thickness of 0.008 inches (8 mils), and furnish a certificate of conformance of the material to the requirement of AWWA C105.

5. UNRESTRAINED PIPE JOINTS: Ductile iron pipe joints shall be push-on rubber gasket type or rubber-gasket mechanical joint per AWWA C111 in unrestrained applications. Unrestrained pipe joints shall be by one of the following or an approved equal:

   a. “Tyton Joint Pipe” by US Pipe and Foundry Company.

   b. “Fastite Joint Pipe” by the American Cast Iron Pipe Company.

   c. “Tyton Joint Pipe” or “Fastite Joint Pipe” by McWane Company.

6. RESTRAINED PIPE JOINTS: All ductile iron pipe joints located within the limits of restrained joint sections shall be provided with restraining harnesses or approved integral restrained push on joints. Location of restrained joints shall be subject to the approval of the Engineer and direct payment will be made per each restrained joint, regardless of the method of restraint. Restraints for ductile iron pipe joints shall be push on rubber gasket with integral proprietary restrained joint or a mechanical restraint harness manufactured for ductile iron push on joint pipe. Restraint harnesses shall be Series 1700 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal. Restrained push on joints shall be by one of the following or an approved equal:

   a. "TR Flex" or “HP Lock” by US Pipe and Foundry Company.

   b. "Flex Ring (positive locking style)" by the American Cast Iron Pipe Company.

   c. "TR Flex" by McWane Company.

7. Fittings for ductile iron pipe shall be ductile iron and conform to Section 2.03.

8. Ductile iron pipe shall be manufactured in the United States by American Cast Iron Pipe Company, McWane Company, U.S. Pipe and Foundry Company, or approved equal.

C. High Density Polyethylene Pipe (HDPE Pipe)

1. HDPE Pipe shall be AWWA C906, DIPS, SDR11, PE 3408 High Density, DIPS, Cell Classification 345434C, in accordance with ASTM D3350.

2. The pipe shall have a blue stripe.

3. Transition Fittings shall be a mechanical joint adapter (Harvey Adapter) fabricated from HDPE pipe conforming to ASTM 3350. The adapter shall have a pre-positioned stainless steel stiffener and shall offer full axial restraint as manufactured by JCM Industries, or approved equal.

4. Butt-fusion of pipes and fittings shall be performed in accordance with the pipe manufacturer's recommendations as to equipment and technique. Fusion shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.

5. Fittings for HDPE pipe shall be ductile iron and conform to Section 2.03.

2.03 FITTINGS

A. Mechanical joint ductile Iron fittings shall be used for HDPE, PVC, and Ductile Iron Water Mains.

B. Ductile iron fittings shall be standard body ANSI A21.10/AWWA C110 or compact body ANSI A21.53/AWWA C153, as required by the construction documents. The rated working pressure shall be 350 psi for 24-inch and smaller and 250 psi for 30-in and larger.

C. The fitting interior shall be double cement lined and seal coated with an asphaltic coating in accordance with ANSI Specification A21.4 (AWWA C104) and ANSI A21.16, latest revision.

D. The exterior of the fitting shall be coated, with an asphaltic coating approximately 1 mil thick in accordance with ANSI Specification A21.51 (AWWA C151), latest revision.

E. All mechanical joint fittings shall be installed with restraining glands in addition to concrete thrust blocks. Restraining glands shall be Series 1300C by Uniflange; Megalug Series 1100 PV or Series 2000PV by EBAA Iron Sales, Inc, or approved equal.

F. All ductile iron fittings shall be installed with polyethylene encasement conforming AWWA C105, installed in accordance with the manufacturer's recommendations. Film shall be Class C-Black, minimum thickness of 0.008 inches (8 mils), and furnish a certificate of conformance of the material to the requirement of AWWA C105.

G. Bolts and nuts shall be alloy steel (Corten Type).

2.04 RESTRAINT HARNESS

A. All pipe joints located within the limits of restrained joint sections shall be provided with restraining harnesses or approved integral restrained push on joints. Location of restrained joints shall be subject to the approval of the Engineer. Restraints for joints shall be push on rubber gasket with integral proprietary restrained joint or a mechanical restraint harness manufactured for push on joint pipe. Restraint harnesses shall be Series 1700 or Series 2800 Megalug® restraint harness, manufactured by EBAA Iron, Inc., or approved equal.

B. Bolts and nuts shall be alloy steel (Corten Type).

2.05 RESILIENT SEATED GATE VALVES

A. Resilient wedge gate valves shall meet or exceed all applicable requirements of ANSI/AWWA C515 or ANSI/AWWA C509 standards, latest revision. They shall be UL listed, FM approved and certified to ANSI/NSF 61 and ANSI/NSF 372.

B. Valve type shall be non-rising stem (NRS), dual seal between gate and body, smooth closing gate and one piece cast-iron wedge with integral lugs. Valves shall have standard o-ring seals, two o-ring seals shall be set above the stem thrust collar and one below.

C. Valves shall have Type 304 stainless steel bolts and nuts for the stuffing box and bonnet.

D. The internal and external ferrous components of the valve shall be fusion bonded epoxy coated meeting ANSI/AWWA C550 Standard. Coating shall be applied prior to assembly to assure coverage of all exposed areas.

E. Valves shall have the manufacturer's name, size of the valve, and working pressure cast into the exterior of the valve.

F. Valves for buried service shall be mechanical joint as per AWWA C111 and shall be provided with a 2" square operating nut as standard. Buried gate valves shall be installed in the vertical position, unless otherwise directed by the Engineer and approved by the City of Lake Charles. Buried gate valves installed in the horizontal position shall have guides and/or rollers to the support the gate. Valves for buried service shall have an arrow cast on the ductile iron operating nut showing opening direction; direction to open shall be counter-clockwise. Bolts and nuts for direct bury mechanical joint assembly shall be alloy steel (Corten Type).

G. Valves for above grade service in meter vaults shall have flanged ends conforming to the AWWA C500, class 125. Above grade service valves shell be provided with a hand wheel showing opening direction; direction to open shall be counter-clockwise. Bolts and nuts for flange to flange assembly shall be low carbon steel conforming to ASTM A193, Grade B7.

H. Valves in buried service shall be Mueller Series A-2360 (AWWA C-509) or A-2361(AWWA C-515), American Flow Control Series 2500 (AWWA 515) or M&H Style 4067-01.

2.06 VALVE BOXES

A. Each buried gate valve shall be provided with a cast iron valve box and cover. Valve box shall be of the two-piece or three-piece screw sleeve adjustable type, suitable for the various line depths. The interior and exterior components of the valve box shall be bituminous coated. All valve boxes shall be provided with cast iron covers on which the word "WATER" shall be cast into the top. Valve box shall be Tyler Series 6850 or Series 6860, Sigma Corp. Model No. VB-262, or approved equal.

B. A 24-inch round, pre-cast concrete pad shall be provided on all valve boxes installed outside of paved surfaces. Round valve box pads shall be as manufactured by Southern Meter Box, Inc., or approved equal.

2.07 CASING FOR JACKING AND BORING

A. Unless otherwise required by the agency having jurisdiction, the casing shall be welded steel pipe meeting ASTM A53, Grade B, and have a minimum yield strength of 35,000 psi. The exterior of the casing pipe shall be coated with coal tar epoxy or bituminous asphalt. Minimum wall thickness shall be as shown in the following table:

Table for minimum wall thickness for steel casing pipe for E72 loading		
Carrier Pipe Nominal Diameter (inches)	Min. Casing Pipe Diameter (O.D.) (inches)	Nominal Thickness (inches)
6	12	0.344
8	16	0.375
10	20	0.407
12	24	0.469
14	27	0.505
16	30	0.505
18	30	0.505
20	36	0.595
24	36	0.595
30	42	0.625
36	48	0.688
42	60	0.844

2.08 TRACER WIRE

A. Tracer wire for horizontal directional drilling operations shall be 8 gauge, Copper Clad Steel, extruded with a 45 mil (minimum) HDPE coating, .219 inches (minimum) O.D. Rated break load 2,785 lbs., 30 volt, 21% IACS. The outside color of the wire shall meet the APWA color code of the buried utility line. Tracer wire shall be Pro-Trace HDD-CCS PE45 as manufactured by Pro-Line Safety Products Co., or approved equal.

B. Tracer wire for direct bury shall be 12 gauge, Copper Clad Steel, extruded with a 45 mil (minimum) HDPE coating, .219 inches (minimum) O.D. Rated break load 713 lbs., 30 volt, 21% IACS. The outside color of the wire shall meet the APWA color code of the buried utility line. Tracer wire shall be Pro-Trace HF-CCS PE45 as manufactured by Pro-Line Safety Products Co., or approved equal.

C. The wire shall be held in place by tacking it to the top of the pipe using duct tape at approx. 10 foot centers and shall be continuous for the entire length of the water line. Sufficient slack shall be provided at each valve location in order that the wire can be pulled up into the valve box for easy access.

D. Attach wire to all fixtures and appurtenances to ensure continuous flow of electrical current.

E. Splices in detection wire shall be installed in a per the manufacturer's directions.

2.09 HYDRANTS

A. Fire hydrants shall be 3-way type, 5-1/4" valve opening, 6" mechanical joint shoe for a 4'-0" bury (or for the bury as called for in the proposal). Hydrants shall be standard AWWA Type, complete 2-1/2" hose nozzles and 4-1/2" Pumper nozzle, with Lake Charles special threads. The Contractor shall note that the finished elevation of the fire hydrant shall be so that it provides a minimum of 18 inches clear between the finished grade and the bottom of the pumper nozzle.

B. Hydrants shall Mueller Centurion model A-423, as manufactured by Mueller Company; American

Darling model B-84-B, as manufactured by American Cast Iron Pipe Company; M&H Model 129, as manufactured by M&H Valve Company; or approved equal.

2.10 TAPPING SLEEVES AND VALVES

A. Tapping sleeves shall be stainless steel and be provided with SST flanges. Tapping sleeves shall be ROMAC Stainless Steel Tapping Sleeve (SST), as manufactured by Romac Industries, Inc.; Ford All Stainless Tapping Sleeve (FAST), as manufactured by the Ford Meter Box Company, Inc., or approved equal. Tapping sleeves shall be provided with 304 Stainless Steel bolts, nuts and washers.

B. Tapping valves for 3-inch lines and larger shall be Resilient Seated Wedged Tapping valves with Flanged by Mechanical Joint Ends conforming to AWWA C509 or C515 as applicable. Tapping valves for 2-inch service lines shall be Resilient Seated Wedged Tapping valves with threaded ends compatible with the specified service saddles. Tapping valves shall be provided with a minimum 3/8-inch NPT pipe plug on the bonnet of the valve body for field testing. Tapping valves shall be Mueller Model T-2360-16 Resilient Wedge Tapping Valves as manufactured by Mueller Co.; American Series 2500 Resilient Wedge Tapping Valve, or approved equal. Tapping sleeves shall be provided with 304 Stainless Steel bolts, nuts and washers.

C. All tapping valves shall be provided with valve boxes as specified in part 2.06 of these standard specifications.

2.11 CONCRETE

A. Concrete for thrust blocks and pads shall be 3000 psi at twenty eight (28) days. Concrete shall be ready mix; Sakrete will not be acceptable.

2.12 COMBINATION AIR VALVES

A. Combination air valves shall be installed on high points along the water main, as well as, those locations, where in the opinion of the Engineer air may become trapped in the water main.

B. Combination air valves shall be Golden Anderson, Figure 950, as manufactured by Golden Anderson Industries, or approved equal.

C. Air Valves shall be installed in a Pre-Cast Concrete manhole in accordance with the City of Lake Charles specifications for concrete manholes.

2.13 SERVICE SADDLES

A. Service Saddles shall be ductile iron with a finish coat of fused nylon approx. 10-12 mils thick for service line sizes up to 2-inches. The straps, nuts, and bolts shall be stainless steel. Service saddles shall be one of the following as manufactured by ROMAC with I.P. threads, or approved equal.

1. 101NS for 1-inch taps on 12-inch and smaller PVC mains

2. 202NS for 1-inch taps on 14-inch and larger PVC mains

3. 202NS for 2-inch taps on all PVC main sizes

4. 101N-H for 1-inch taps on 12-inch and smaller HDPE mains

5. 202N-H for 1-inch taps on 14-inch and larger HDPE mains

6. 202N-H for 2-inch taps on all HDPE main sizes

B. Taps for service lines greater than 2-inches shall be completed with stainless steel tapping sleeves and tapping valves as specified in part 2.10 of these standard specifications.

2.14 CORPORATION STOPS

A. Corporation stops for 1-inch diameter service lines shall be provided with AWWA taper threaded inlet and compression connection for CTS tubbing outlet. Corporation stops shall be Mueller (CC) Thread Cat. #H-15008; Ford Meter Box Company Cat #F-1000-CC, or approved equal.

2.15 CURB STOPS

A. Curb stops shall be provided for all 1-inch and smaller service connections. Curb stops shall be 1-inch and manufactured with either compression connections or pack joints for 1-inch CTS OD tubing on both ends. Curb stops shall be Mueller Mark II Oriseal Cat# H15209, Ford Ball Valve Curb Stops Cat# B41-344-NL-W, or approved equal.

2.16 SERVICE LINE

A. Service pipe shall be high density polyethylene (HDPE), SDR9. Service pipe shall be 1" diameter minimum and shall be provide in CTS outside diameter sizing. Pipe shall meet the requirements of AWWA C-901, "Polyethylene Pressure Pipe, Tubing and Fittings, 1/2" through 3" for Water." CTS sized pipe shall have service identification stripes of longitudinal blue color stripes co-extruded into the pipe outside surface. Striping printed on the pipe exterior shall not be acceptable. All service pipe shall be installed with tracer wire. Stainless steel insert stiffeners shall be used where connections are made.

2.17 COMPRESSION COUPLINGS

A. Compression couplings shall be as manufactured by Rockwell Type 411 or Type 441, or JCM #212, or equal, with stainless steel bolts. PVC couplings are not allowed.

2.18 ADAPTERS AND FITTINGS

A. All adapters and fittings shall be bronze or brass. Galvanized adapters or fittings are not allowed.

2.19 LINE SETTERS

A. Linesetters , for 3/4" x 5/8" meters shall be Ford Meter Box Company Model LSVH 48-243W-AWT, 1" CTS inlet and 3/4" male swivel outlet, or approved equal.

B. Coppersetters for 1-1/2" meters shall be Ford Meter Box Company Model VH76-12B-11-66, or approved equal.

C. Coppersetters for 2" meters shall be Ford Meter Box Company Model VH77-12B-11-77, or approved equal.

2.20 METER BOXES

A. All new water meter boxes shall be pre-cast concrete with cast iron lid and cast iron reader as manufactured by Southern Meter Box, Inc. or Old Castle Precast, Inc. Meter boxes shall be of the make and model as provided below.

1. Southern Meter Box Company

   a. ¾-inch x 5/8-inch meter and linesetter (C.H.1-1/2" with T.H. 1-1/2" Lid)

   b. 1-1/2-inch meter and coppersetter (C.H. 2" with T.H. 2" Lid)

2. Old Castle Precast, Inc.

   a. ¾-inch x 5/8-inch meter and linesetter (B16 Box with B16CG Lid)

   b. 1-1/2-inch meter and coppersetter (B30 Box with B30CG Lid)

   c. 2-inch meter and coppersetter (B36 Box with B36CG Lid)

2.21 METERS

A. All water meters shall be provided by the City of Lake Charles Water Division, unless otherwise approved by the Water Division.

2.22 FOUNDATION, BEDDING AND BACKFILL MATERIAL

A. Foundation Material

1. Crushed limestone or crushed Portland cement concrete shall be used for structure foundations and pipe foundation amendments as detailed herein. Crushed limestone or crushed Portland Cement Concrete foundation material shall meet the following #610 gradations.

Sieve Size	Percent Finer By Weight
1 – ½ in	100
1 - in	90 to 100
3/4 - in	70 to 95
3/8 - in	50 to 80
No. 4	35 to 65
No. 10	25 to 50
No. 40	10 to 26
No. 200	4 to 12

B. Bedding and Embedment Material

a. Sand shall be used for bedding and initial backfill of the watermain and services as further detailed herein. Sand for embedment shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	Percent Finer By Weight
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

C. Backfill Materials

1. Usable Native Excavated Soils shall be used for trench back fill when the entirety of the trench is located more than five (5) feet from the edge of the roadway or paved surface. Usable native excavated materials shall meet the following requirements.

a. Usable native excavated soils shall have a maximum PI of 25 and maximum organic content of five (5) percent. Soils with a silt content of fifty (50) percent or greater and also a PI of ten (10) or less will not be allowed. Any select material used to supplement or replace usable excavated soil shall meet these requirements and must be approved by the Engineer. Soil shall be tested at the Engineer and the Owner's option. Usable excavated material may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Owner's access nor inconvenience traffic adjoining property owners.

b. When excavated soils do not meet the above stated requirements they shall be removed from the site, at the contractors expense, and replaced with Select or Sand Backfill Material.

2. Select or Sand Backfill Material shall be used for trench backfill when any portion of the trench is to be installed within five (5) feet from the edge of the roadway or paved surface.

a. Sand for backfilling trenches and structures shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	Percent Finer By Weight
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

b. Select backfill material shall be natural soils with a maximum PI of 20, maximum Liquid Limit of 35, and a maximum organic content of 5 percent. Soils with a silt content of 50 percent or greater and also a PI of 10 or less shall not be allowed.

3. Crushed limestone or Crushed Portland Cement Concrete Backfill

a. Crushed limestone or crushed Portland Cement Concrete backfill material shall be used for trench backfill when the trench is to be installed beneath any paved surface, or as directed by the Engineer. Crushed limestone or crushed Portland Cement Concrete backfill material shall meet the requirements set forth above for Foundation material.

PART 3 EXECUTION

3.01 GENERAL

A. Coordinate with other utility providers to the fullest extent possible complete maximum spacing from all utilities for ease of access following installation.

B. Any materials damaged during installation shall be removed and discarded.

3.02 ALIGNMENT AND GRADE

A. The contractor shall use a chalk line to assist in alignment of the pipe line.

B. Whenever obstructions not shown on the plans are encountered, and the Engineer deems it necessary to change alignment to expedite the work, if the change in plans result in a change of the amount of work by the Contractor, such altered work will be allowed the Contractor on the basis of bid unit prices or extra work order, whichever the case may be.

C. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part. Unless specifically ordered by the Engineer, the minimum coverage of this pipe line shall be forty-eight inches (48").

3.03 TRENCHING AND EXCAVATION

A. Excavation

1. Excavation shall include the removal, handling, re-handling, refill or backfilling, and disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing, and trench box. The work of excavation shall also include the responsibility of added expenses or other liability that may arise from quicksand, obstacles or conditions, foreseen or unforeseen, which may be encountered in the work. It includes clearing and the removal of pavements, curbs, sidewalks, shrubbery, and other obstructions not otherwise provided for.

2. The trench shall be dug so that the pipe can be laid to the alignment and depth required and it shall be excavated no more than 500 feet in advance of pipe laying. If necessary, the trench shall be braced such that the men may work therein safely and efficiently. The trenches shall be free of water at the time of pipe laying. The minimum width of the unbraced trench shall be 18 inches or one foot greater than the outside diameter of the

pipe, whichever is greater. The pipe shall be laid on stable soil, free from rocks, clods, or sharp-edged objects. Any part of the trench excavated below grade shall be backfilled to grade with thoroughly compacted material approved by the Engineer. The maximum deflection per length of pipe shall be as recommended by the pipe manufacturer.

B. Methods of Excavation

1. The Engineer shall have the authority, at any time, to require the Contractor to discontinue the use of any excavating machine or other appliance which, in the Engineer's judgment, is not adapted to the purpose for which it is used.

C. Dewatering

1. The trenches shall be maintained free of water at all times while work is in progress, and water shall not be allowed to flow over or rise upon earth foundations, pipe, concrete masonry, or other work, except as otherwise specified for bayou crossings and special "wet areas." The Contractor shall not open more trench than the available pumping facilities can dewater to the satisfaction of the Engineer.

2. The Contractor shall assume all responsibility for disposing of all water so as not to injure or interfere with normal drainage of the locality. In no case shall water pipe lines be used as drains for such water. The ends of water pipe lines shall be adequately and properly plugged during construction by the use of approved stoppers (a garbage bag is not an approved stopper), and all necessary precautions shall be taken to prevent the entrance of ground water, mud, sand, or any other objectionable materials into the pipe lines. If such materials enter the pipe lines, they shall be removed by the Contractor as soon as possible after discovery thereof.

D. Maintenance of Excavation

1. The Contractor shall maintain all excavation in good order during the construction, so as not to hinder or injure the pipe laying, masonry, or other work. He shall take all reasonable precautions to prevent movement of the sides of such excavation, and shall remove at his own expense any material sliding into the excavation.

E. Sheeting and Bracing

1. The Contractor shall furnish and put in place such sheeting and bracing as may be required to support the sides of all trenches or other excavations and, where required, remove, or cut off, as directed, such sheeting at his own expense. A steel trench box, supplemented with additional sheeting, may be used in lieu of total sheeting and bracing.

F. Disposal of Excavated Material

1. All material excavated shall be placed so as to interfere as little as possible with public travel. In case the street is not wide enough to allow the dirt to be piled up without blocking the sidewalk, the Contractor shall, at his own expense, maintain an open passageway not less than two and one-half feet (2 ½') wide on the sidewalk and shall keep this passageway free from mud and slush.

2. The Contractor may deposit excavated materials directly in permanent position insofar as is consistent with the proper prosecution of the work. Materials that cannot be placed at once in permanent position shall be deposited in temporary storage piles. All this work shall be done with reasonable neatness and excavated materials shall not be carelessly strewn over the area.

3. Surplus excavated material over and above that required for backfilling, mounding over the pipe and making other fills and embankments to the finished lines and grades indicated on the drawings shall be disposed of as directed by the Engineer. The Contractor shall be responsible for seeing that the material is dumped in an orderly manner within the limits designated. The surface of the dump shall be neatly graded to blend with the natural contours of the existing ground surface. If the City or Drainage Board has no use for the surplus material, it will be the responsibility of the Contractor to properly dispose of said surplus.

3.04 BEDDING

A. Once the excavation is complete to the required grade of the bottom of the trench, sand bedding 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. Bedding shall be placed evenly on each side of the pipe to the springline and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe.

B. Where the bottom of the excavation is not, in the opinion of the Engineer, of suitable material for the construction of required pipe foundation, the excavation shall be deepened by a minimum of 6-inches and a limestone foundation shall be placed under the pipe as directed by the Engineer. This stone foundation is not to be included in the price bid for laying pipe and will be paid for as a separate item.

C. Where the Contractor exceeds the maximum trench width to the extent that excessive backfill loads are imposed on the pipe, or where the trench is over-excavated, as determined by the Engineer; the Contractor shall provide limestone or such additional pipe foundation as the Engineer may require without any additional compensation. Over-excavated trenches shall not be brought up to grade with excavated material.

3.05 PIPE INSTALLATION

A. Thoroughly clean interior of pipe before lowering into the trench while keeping pipe interior free of foreign matter during laying operations.

B. When work is not in progress, the ends of the pipe and fittings shall be plugged so foreign material cannot enter pipe.

C. Provide bell holes at each joint to permit proper joint assembly and uniform pipe support.

D. The pipe shall be installed and backfilled in accordance with the manufacturer's specifications. Items of work not mentioned specifically herein shall be performed in compliance with the

current revision of AWWA C605, "Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water."

E. The trench shall provide continuous support for the pipe without voids or soft spots under the pipe.

F. Concrete thrust blocks shall be provided at all fittings where a change of direction occurs or as specified by the Engineer for all pipe three (3") in diameter or greater. Thrust blocks shall be poured against undisturbed soil and shall not cover the bolts or nuts on the fittings. A plastic barrier shall protect bolts or nuts from being covered.

G. The water main shall be installed in steel casing where indicated in the Drawings, typically under state highways, railroads, or as indicated by the Engineer.

H. Pipe shall be laid beneath all ditches, sewers, culverts, pipes, conduits, drainage canals, tracks and similar structures. Regular pipe laying methods shall be used in all such cases except where special crossings are indicated.

I. The Contractor shall not operate any valves that will allow water to flow or stop the flow of water. These valves will be operated by the City of Lake Charles Water Division exclusively.

J. Water service to customers shall be maintained without interruption as much as possible. Interruption of service shall be allowed only at times agreed to by the Owner and with proper notice to the customer (at least one hour in advance).

K. The Owner may require that major connections which require lengthy interruptions to service be made during periods of low water use or that temporary service lines be provided by the Contractor at no additional cost to the Owner.

L. Assembly of fittings and other preparatory work shall be done in advance to reduce the off time and to keep interruption to a minimum.

3.06 SETTING VALVES

A. Valves, fittings, plugs, caps, etc., shall be set and jointed to pipe in the manner specified in the preceding paragraphs for cleaning, laying, and jointing pipe.

B. Valve boxes shall be provided for every valve except as shown on the plans. Before placing in the trench, all valves shall be carefully inspected for possible damage.

C. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished pavement, or such other level as may be directed.

3.07 AIR VALVE INSTALLATION

A. Combination air valves shall be installed in a Pre-Cast concrete manhole in accordance with the City of Lake Charles manhole specifications.

B. The air valve shall be installed in accordance with the manufacturer's printed instructions.

C. The air valve shall be oriented in the vault for easy access and maintenance.

D. The manhole shall be installed on a foundation of 6-inches of No. 57 Limestone.

3.08 LEAKAGE TESTING:

A. All pipe lines shall be tested as specified herein and as otherwise required to demonstrate that they will successfully withstand 150 psi operating pressure without leakage in excess of the specified maximum in any test section of the pipe line, all as approved by the Engineer.

B. Whenever conditions will permit, in the opinion of the Engineer, the pipe lines shall be tested before the pipe joints are backfilled. All uncovered joints shall be examined during the tests and all visible leaks shall be entirely stopped. Joints which leak shall be re-made and re-tested until found to be satisfactory.

C. Water used for testing shall be reasonably clean and free from oil, silt, mud, sticks, vegetable matter, and other objectionable materials. All water required for testing shall be furnished by the Owner.

D. Corporation stops shall be provided at high places on the pipe line for expelling air from the line, except at the high points where air valves may be indicated on the plans. Also, one corporation stop shall be furnished and installed for each test pump location. No direct payment.

E. When a section of pipe line of a length deemed suitable by the Engineer is ready for testing, it shall be given the specified leakage test and, if defects are discovered, it shall be retested after replacement of all defective items found therein. On the water distribution system, where practicable, the test length preferably shall not exceed 2,000 feet, and it shall not exceed 4,000 feet unless specifically approved by the Engineer due to the location of valves or other pipe line conditions.

F. For leakage tests of pipe lines, prior to meters, the air shall be completely expelled from the section of pipe line to be tested, and the test shall be made at a hydrostatic pressure of not less than 150 psi for a duration of not less than four (4) hours, during which the leakage shall not exceed one (1) gallon per inch of nominal diameter per mile of pipe per hour. In all cases, the test period shall be of sufficient duration to permit proper examination of pipe joints and other items in the test section of pipe line.

G. For leakage tests of plumbing lines, lines which proceed the meter, the air shall be completely expelled from the section of pipe line to be tested, and the test shall be made at a hydrostatic pressure of not less than 150 psi for a duration of not less than four (4) hours, during which the leakage shall not exceed one (1) gallon per inch of nominal diameter per mile of pipe per hour. In all cases, the test period shall be of sufficient duration to permit proper examination of pipe joints and other items in the test section of pipe line.

H. All pipe, joints, fittings, valves, hydrants, and other items found to be cracked, leaking or otherwise defective, shall be removed and replaced, and the pipe lines shall be retested until the test requirements have been complied with.

3.09 BACKFILL

A. After the pipe lines have been laid and approved, the trenches shall be backfilled with sand up to a foot above the top of the pipe. All trenches shall be backfilled by hand from the bottom of the trench to the springline of the pipe. The sand shall be carefully deposited on both sides of the pipe at the same time and thoroughly tamped and rammed under and around the pipe until enough fill has been placed to provide a cover of at least one foot above the pipe bells. The remainder of the backfill shall be with fine, loose, selected materials free from clods, clumps, sticks, stones, and foreign matter.

B. When the new water line is placed within public road right-of-way by open cut method, the trench shall be backfilled to grade by approved methods and uniformly compacted in 12" lifts to 95% Standard Proctor (ASTM D698), and tested at a minimum rate of two (2) tests per 100 feet of trench. When the new water line is placed by open cut method, within State or Federal road right-of-way or servitudes, the trench shall be backfilled according to Article 701.08, "Backfilling," of the LA. DOTD Standard Specifications for Roads and Bridges, latest revision. When the new water line is installed by open cut within easements or servitudes not directly influenced by vehicle movement, the backfilled density shall meet that of the adjacent soil, subject to Engineer's approval.

C. Laboratory services for backfill density shall be performed by a commercial laboratory approved by the Engineer. If settlement occurs the trenches shall be refilled, compacted, and made to conform to the original ground surface. The Contractor shall maintain the trenches in good and safe condition until final acceptance of work by the Owner, and he will be held responsible for any accident or damage to persons or property during the period of construction and for one year following the date of acceptance.

D. The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures which may be damaged as a result of backfill failure.

E. Pavement repair shall otherwise be in accordance with the City of Lake Charles Paving Specifications.

3.10 JACKING AND BORING

A. Where pipe lines are permitted or required to be jacked under roadways or other locations (with or without a sleeve pipe), the sleeve pipe or pipe line shall be installed by means of a boring machine or auger and hydraulic jack, or by other means satisfactory to the Engineer. In the event subsurface operation results in injury or damage to the pavement, repairs to this pavement shall be made by the Contractor at no additional cost to the owner. In the event the paving cracks on either side of the pipe line, or is otherwise disturbed or broken due to the Contractor’s operations, he shall repair or replace same at his own expense without further compensation.

B. Where the boring location crosses a State or Federal highway, installation of the casing shall also be in accordance with all the requirements of the D.O.T.D. project permit issued for that location and the Contractor shall bid accordingly.

C. Any pipeline installed through a casing will be installed according to manufacturer’s

recommendation, including, but not limited to, the following:

1. Pipe line properly supported on skid

2. Sand bedding of pipe line in casing

3. Properly sealing ends of casing pipe

3.11 DIRECTIONAL DRILLING:

A. The drilling shall be performed by a company with sufficient experience and expertise to perform the work in conformance with the drawings and these specifications. The contractor is responsible for all cleanup and disposal of debris, cuttings, soil, etc., and shall perform this portion of the work in an environmentally sound manner.

B. The Contractor shall clean up and dispose of excess drilling mud associated with the boring process. The mud shall be disposed of in a timely manner. All driveways, pavement, and walkways shall be cleaned at the end of each day. Excess mud in the roadside ditches shall be managed so as not to block drainage during the process of the work. This cleanup shall proceed with the work and not be left for the end of the project.

3.12 DISINFECTION

A. After satisfactory tests have been performed and before being placed in service, all pipe lines shall be disinfected. The expense involved shall be borne by the Contractor except for the water required which shall be furnished by the Owner from the waterworks system without charge to the Contractor.

B. Disinfecting the water mains shall be done according to the provisions of AWWA C651-86. This work shall be performed in segments of the pipe line in accordance with a schedule to be submitted by the Contractor and approved by the Engineer before any work is commenced. As segments are disinfected and put into service after the Louisiana State Board of Health approval, periodic samples shall be taken from completed sections as an added safety precaution until completion of the entire project.

C. The City of Lake Charles Water Division Laboratory is certified by the State Health Department to sample the new water lines for purposes of determining that the new lines are free from contamination by coliform bacteria. There is not a fee for this service, and Contractors can contact the City of Lake Charles Laboratory at 491-1599, or the laboratory directly at 491-1554 to coordinate the sampling. The line will not be accepted and placed in service until clear samples are received.

D. Samples shall be taken from corporation stops installed in the lines as directed by the Engineer, and installed for the sole purpose of testing the lines.

E. After thorough flushing, sufficient available chlorine shall be added to the water in the line to show a minimum residual of 50 PPM. This chlorinated water shall then be drawn off from each deadend until an orthotolidin test shows a strong indication of chlorine. As the water is drawn off and new water added, this new water shall be chlorinated. After all points show an indication of chlorine, the chlorinated water shall remain in the system for twenty-four (24) hours, after which

period it shall be flushed out with potable water. Should subsequent bacteriological tests show any pipe lines to be contaminated, the chlorination process shall be repeated in such pipe lines until satisfactory results of tests are obtained. No water from any pipe line shall be used for human consumption until bacteriological tests indicated that the water is entirely free of bacterial contamination.

F. Chlorine in liquid gas form, calcium hypochlorite, chlorinated lime, or sodium hypochlorite may be used, but the Engineer's approval of the material and procedure shall be given before any work is commenced.

END OF SECTION

SECTION 4
STORM DRAINAGE COLLECTION SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing all labor, supervision, materials, equipment, tools, and supplies necessary for the installation of, pipe culverts, pipe arch culverts, storm drains and sewers, herein referred to as "conduit", and drainage structures in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the Engineer.

B. All work in this section shall be in accordance with the Louisiana Standard Specifications for Roads & Bridges, 2006 Edition, except as modified herein. When the term "Department" is utilized it shall mean "Engineer".

C. Where a certain pipe material and size is specified on the plans, only that material and size can be used. All pipe material used between consecutive structures in the storm sewer line shall be of the same kind unless otherwise provided by the plans.

1.02 REFERENCES

A. All materials and designs shall conform to the requirements of these specifications. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI)
3. Concrete Reinforcing Steel Institute (CRSI)
4. American National Standards Institute (ANSI)
5. The Society for Protective Coatings (SSPC)
6. Louisiana Department of Transportation and Development (LADOTD)

B. The same manufacturer shall supply all like materials of the same class, unless specified to the contrary.

1.03 SUBMITTALS

A. Submittals and test reports shall be made available to the City of Lake Charles Engineering Department at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Engineering Department for approval prior to acceptance of the storm drainage collection system. Project record documents shall accurately record locations of pipe runs, manholes, and collection boxes with as-built invert elevations within rights-of-way or permanent easements.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the storm drainage collection system must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications described herein;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located within acceptable rights-of-way to be dedicated to the City;

6. Accurately depicted in record documents to be submitted to the City.

1.05 QUALITY ASSURANCE

A. Laboratory Services: Laboratory services shall be performed by a commercial laboratory approved by and paid by the Engineer.

B. Duties: The laboratory will review the Contractor furnished design mix to determine compliance with these specifications. The laboratory will inspect and test all materials entering concrete, analyze aggregate for quality, durability, grading and free water content, take representative specimens of ingredients and mixes, and make test cylinders and measure compressive strength of same. The laboratory shall check the moisture content of aggregate and control the mix. It is the intent of these specifications to have batch plant and job site laboratory control. Job site laboratory control shall include job mixing, handling, and placing of concrete.

C. Test Procedures: All test specimens shall be taken and laboratory tests conducted in conformance with the latest standard test procedure of the ASTM, as amended to date of contract, and when not covered therein shall be sampled and tested in accordance with the "Standard Specifications for Roads and Bridges" of the Louisiana Department of Highways, 2006 Edition, with subsequent revisions to date of contract. All tests not covered by the above shall be performed as specified by the Engineer.

D. Test Reports: The laboratory shall furnish promptly to the Contractor and the Engineer written reports covering the results of all tests and inspections made.

E. Test Cylinders: A minimum of two (2) sets of four (4) cylinders each will be made for each day's pour for over 25 cubic yards, and one (1) set will be required for 25 cubic yards or less. Of each set of test cylinders, two (2) will be tested for compressive strength at the age of seven (7) days;

and two (2) will be tested at the age of twenty-eight (28) days. If any cylinder fails to meet the specified strength requirements, the Owner shall have the right to require changes in proportions, require additional curing time, and/or take other measures for enforcement of strength requirements.

F. Contractor's Responsibility: It shall be the responsibility of the Contractor to provide the concrete mix design, to produce concrete of the strength, durability, workability and finish specified, submit the mix design for approval, furnish representative material for specimens in quantities required by the testing laboratory; cooperate and assist in taking samples of materials for testing.

1.06 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the City within the guarantee period.

PART 2 PRODUCTS

2.01 MATERIALS

A. All storm drainage materials shall conform to the following sections of Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as modified by these specifications. All materials provided under this specification must be qualified under the LADOTD MATT SYSTEM.

1.	Portland Cement Concrete:	901
2.	Aggregates:	1003
3.	Reinforced Concrete Pipe:	1006.03
4.	Reinforced Concrete Pipe Arch:	1006.04
5.	Concrete Pipe Joints:	1006.05
6.	Gasket Materials:	1006.06
7.	Plastic Pipe:	1006.07
8.	Plastic Yard Drain Pipe:	1006.09
9.	Coal Tar Epoxy	1008.04
10.	Reinforcing Steel:	1009
11.	Curing Materials:	1011.01

12.	Precast Reinforced Drainage Units	1016
13.	Water	1018.01
14.	Frames, Grate and Manhole Covers	1018.04
15.	Form Release Agent:	1018.25
16.	Geotextile Fabric	1019

2.02 CULVERTS AND STORM DRAINS

A. Culverts and storm drains provided under this specification shall be in accordance with the Section 701 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

B. Reinforced Concrete Pipe

1. Reinforced-Concrete Pipe shall comply with ASTM C 76 (ASTM C 76M). Pipe shall be Class III, Wall B, for O-Ring gasketed joints.

2. Reinforced Concrete Arch Pipe shall comply with ASTMC 506. Pipe shall be class A-III.

3. Pre-Cast Reinforced Concrete Box Culverts shall comply with ASTM C 1433, Table 1.

4. Joints:

   a. RCP: Joints shall be Type III bell and spigot end joints, as specified in subsection 1006.05(c) of LADOTD Standard Specifications, meeting the requirements of ASTM C 443.

   b. RCPA: Joints shall be Type III, as specified in subsection 1006.05(c) of LADOTD Standard Specifications, meeting the requirements of ASTM C 443.

   c. Pre-Cast Reinforced Concrete Box Culvert: Joints shall meet the requirements of ASTM C 990

5. Pre-Cast Concrete Culvert Gaskets:

   a. RCP: Rubber gaskets meeting the requirements of AASHTO M315 and ASTM C 443, Type A; lubricant as specified by manufacturer.

   b. RCPA: Rubber gaskets meeting the requirements of AASHTO M315 and ASTM C 443, Type A; lubricant as specified by manufacturer.

   c. Pre-Cast Reinforced Box Culvert: Pre-formed flexible joint sealant meeting the requirements of AASHTO M 198 and ASTM C 990.

C. Plastic Pipe

1. Plastic pipe shall be Ribbed Polyvinyl Chloride Pipe (RPVCP) as specified in subsection 1006.07(a) of the LADOTD Standard Specifications.

2. Plastic pipe shall only be allowed for use as side drains and only when outside of pavement.

3. Joints for plastic pipe shall be Type III, as specified in subsection 1006.07(d) of LADOTD Standard Specifications

2.03 MANHOLES, JUNCTION BOXES, CATCH BASINS, AND END TREATMENTS

A. Storm drainage manholes, junction boxes, catch basins, and end treatments provided under this specification shall be in accordance with the Section 702 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

1. Curb inlets shall be provided with an LADOTD Type H Cast Iron Cover, Grate and Frame with the inscription "City of Lake Charles" in the center and "DUMP NO WASTE", "DRAINS TO LAKE" shall be inscribed on the perimeter.

2. Drop inlets shall be provided with an LADOTD Type E Steel Grate Frame and LADOTD Type C Riveted Reticuline Drain Grate.

3. Manholes shall be provided with LADOTD Type K Cast Iron Frame and Cover with the word "DRAIN" inscribed in the middle.

4. Structure Channels, Benches, and Concrete Collars: Factory or field formed from concrete.

    a. Include channels and benches in manholes.

        1) Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

            i. Invert Slope: 1 percent through manhole.

        2) Benches: Concrete, sloped to drain into channel.

            i. Slope: 8 percent.

    b. Include channels in catch basins.

        1) Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

            i. Invert Slope: 1 percent through catch basin.

5. ALL pre-cast storm drain structures shall be built with oversized pipe penetrations to allow for a minimum 12-inch concrete collar.

2.04 CONCRETE MIX DESIGN

A. Portland Cement Concrete provided under this specification shall be Minor Structure Class "M" concrete in accordance with the Section 901 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition.

2.05 NONPRESSURE TYPE PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.

2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.06 FOUNDATION, BEDDING, AND BACKFILL MATERIAL

A. Foundation Material

1. Crushed limestone or crushed Portland cement concrete shall be used for structure foundations and pipe foundation amendments as detailed herein.

Sieve Size	Percent Finer By Weight
1 – ½ in	100
1 - in	90 to 100
3/4 - in	70 to 95
3/8 - in	50 to 80
No. 4	35 to 65
No. 10	25 to 50
No. 40	10 to 26
No. 200	4 to 12

B. Bedding Material

1. Crushed limestone or crushed Portland cement concrete shall be used for pipe bedding to the depths and heights identified on the project details. Crushed limestone or crushed Portland Cement Concrete bedding material shall meet the requirements set forth above for Foundation material.

C. Backfill Material

1. Usable Native Excavated Soils shall be used for trench back fill when the entirety of the trench is located more than five (5) feet from the edge of the roadway or paved surface. Usable native excavated materials shall meet the following requirements.

    a. Usable native excavated soils shall have a maximum PI of 25 and maximum organic content of five (5) percent. Soils with a silt content of fifty (50) percent or greater and also a PI of ten (10) or less will not be allowed. Any select material used to supplement or replace usable excavated soil shall meet these requirements and must be approved by the Engineer. Soil shall be tested at the Engineer and the Owner's option. Usable excavated material may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the Owner's access nor inconvenience traffic adjoining property owners.

    b. When excavated soils do not meet the above stated requirements they shall be removed from the site, at the contractors expense, and replaced with Select Backfill Material.

2. Sand Backfill Material

    a. Sand backfill material shall be used for trench backfill when any portion of the trench is to be installed within five (5) feet from the edge of the roadway or paved surface. Sand for backfilling trenches and structures shall be non-plastic siliceous material and shall conform to the following gradation limits:

Sieve Size	**Percent Finer By Weight**
½ - in	100
No. 10	75 to 100
No. 200	0 to 10

3. Crushed limestone or Crushed Portland Cement Concrete Backfill

    a. Crushed limestone or crushed Portland Cement Concrete backfill material shall be used for trench backfill when the trench is to be installed beneath any paved surface, or as directed by the Engineer. Crushed limestone or crushed Portland Cement Concrete backfill material shall meet the requirements set forth above for Foundation material.

PART 3 EXECUTION

3.1 GENERAL

A. Storm Sewer lines shall be installed with wall to wall clear separations of not less than 6-feet horizontally and 18-inches vertically from potable water lines. Where these separations are not able to be met, the line shall be encased in concrete.

3.02 INSTALLATION OF CULVERTS AND STORM DRAINS

A. Construction requirements including, but not limited to excavation, forming pipe bed, laying pipe, joining pipe, backfilling, placement of bedding, storm inspection, and cleaning of storm drain pipes shall be in conformance with Sections 701 and 726 respectively, of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as amended herein.

3.03 INSTALLATION OF MANHOLES, JUNCTION BOXES, CATCH BASINS AND END TREATMENTS

A. Construction requirements including, but not limited to the construction, bedding, placement, and backfill of manholes, junction boxes, catch basins and end treatments shall be in conformance with Sections 702 and 726 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as amended herein.

END OF SECTION

SECTION 5

PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing all labor, supervision, materials, equipment, tools, and supplies necessary for constructing a pavement composed of Portland Cement concrete, with reinforcement as specified, on a prepared subgrade or base course in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

B. All work in this section shall be in accordance with the Louisiana Standard Specifications for Roads & Bridges, 2006 Edition, except as modified herein. When the term “Department” is utilized it shall mean “Engineer”.

1.02 REFERENCES

A. All materials, designs, and construction shall conform to the latest revisions of the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI)
3. Concrete Reinforcing Steel Institute (CRSI)
4. American Welding Society (AWS)
5. Federal Specifications (FS)
6. Louisiana Department of Transportation and Development (LADOTD)

1.03 SUBMITTALS

A. Submittals and test reports shall be made available to the City of Lake Charles Engineering Department at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Engineering Department for approval prior to acceptance of the concrete roads. Project record documents shall accurately record locations of pavement features within rights-of-way or maintenance easements.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the concrete roads must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications described herein;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located within acceptable rights-of-way to be dedicated to the City;

6. Accurately depicted in record documents to be submitted to the City.

1.05 QUALITY ASSURANCE

A. Laboratory Services: Laboratory services shall be performed by a commercial laboratory approved by and paid by the Engineer.

B. Duties: The laboratory will review the Contractor furnished design mix to determine compliance with these specifications. The laboratory will inspect and test all materials entering concrete, analyze aggregate for quality, durability, grading and free water content, take representative specimens of ingredients and mixes, and make test cylinders and measure compressive strength of same. The laboratory shall check the moisture content of aggregate and control the mix. It is the intent of these specifications to have batch plant and job site laboratory control. Job site laboratory control shall include job mixing, handling, and placing of concrete.

C. Test Procedures: All test specimens shall be taken and laboratory tests conducted in conformance with the latest standard test procedure of the ASTM, as amended to date of contract, and when not covered therein shall be sampled and tested in accordance with the "Standard Specifications for Roads and Bridges" of the Louisiana Department of Highways, 2006 Edition, with subsequent revisions to date of contract. All tests not covered by the above shall be performed as specified by the Engineer.

D. Test Reports: The laboratory shall furnish promptly to the Contractor and the Engineer written reports covering the results of all tests and inspections made.

E. Test Cylinders: A minimum of two (2) sets of four (4) cylinders each will be made for each day's pour for over 25 cubic yards, and one (1) set will be required for 25 cubic yards or less. Of each set of test cylinders, two (2) will be tested for compressive strength at the age of seven (7) days; and two (2) will be tested at the age of twenty-eight (28) days. If any cylinder fails to meet the specified strength requirements, the Owner shall have the right to require changes in proportions, require additional curing time, and/or take other measures for enforcement of strength requirements.

F. Contractor's Responsibility: It shall be the responsibility of the Contractor to provide the concrete mix design, to produce concrete of the strength, durability, workability and finish specified, submit the mix design for approval, furnish representative material for specimens in quantities required by the testing laboratory; cooperate and assist in taking samples of materials for testing.

1.06 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the City within the guarantee period.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland cement concrete pavement materials shall conform to the following sections of Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as modified by these specifications. All materials provided under this specification must be qualified under the LADOTD MATT SYSTEM.

1.	Portland Cement Concrete:	901
2.	Aggregates:	1003
3.	Joint Fillers:	1005.01
4.	Joint Sealants:	1005.02
5.	Joint Seals:	1005.03
6.	Reinforcing Steel:	1009
7.	Curing Materials:	1011.01
8.	Water	1018.01
9.	Form Release Agent:	1018.25

2.02 CONCRETE MIX DESIGN

A. Portland Cement Concrete pavement provided under this specification shall be Type “B” pavement in accordance with the Section 901 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

1. Concrete shall be non-air entrained.

2. Minimum Cement Content (lb/CY) shall be 545 lbs (5.8 Sack mix).

2.03 REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT

A. Pavement provided under this specification shall be reinforced concrete pavement.

B. Reinforcement for reinforced Portland cement concrete pavement shall be 6”x6” W4 – W4 Welded Steel Wire Fabric.

2.04 REINFORCING STEEL

A. Reinforcing steel provided under this specification shall be in accordance with the Section 1009 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

1. Flat sheets of welded steel wire fabric mesh will be required, rolled mesh will not be acceptable.

2. Wire for Zig Zag high chairs shall meet the requirements of ASTM A 185 and shall be a minimum of 6 gauge.

PART 3 EXECUTION

3.01 PREPARATION

A. Construct subgrade in conformity with lines and grades shown on drawings and as specified in Section 601 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition

B. Do not disturb previously prepared subgrades and subbase course. Where loose soils are encountered beneath pavements, scarify, moisture condition and properly re-compact soils.

3.02 PLACING WELDED STEEL WIRE FABRIC

A. Welded steel wire fabric shall be placed 2-1/2 inches beneath the finished surface of the 6-inch pavement and 3-1/2 inches beneath the surface of 8-inch pavement. Welded Steel Wire Fabric shall be supported on zig zag chairs of the size required to provide 2-1/2 or 3-1/2 inches of cover from the finished surface of the pavement depending upon the required pavement thickness.

B. At all places where the continuity of reinforcement is required, adjacent sheets of the fabric shall be properly lapped. The transverse and longitudinal wires of the fabric shall be lapped not less than twelve (12) inches.

C. Welded steel wire fabric shall not extend across either transverse or longitudinal joints.

3.02 CONCRETE PAVING

A. Construction requirements including, but not limited to forming, placing and finishing concrete, joints and curing shall be in conformance with Section 601 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as amended herein.

END OF SECTION

SECTION 6

PORTLAND CEMENT CONCRETE CURB AND GUTTERS, WALKS, DRIVES AND INCIDENTAL PAVING

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing all labor, supervision, materials, equipment, tools, and supplies necessary for constructing Portland Cement concrete curb and gutter, walks, drives and incidental paving as specified, on a prepared subgrade or base course in accordance with these specifications and in close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

B. All work in this section shall be in accordance with the Louisiana Standard Specifications for Roads & Bridges, 2006 Edition, except as modified herein. When the term “Department” is utilized it shall mean “Engineer”.

1.02 REFERENCES

A. All materials, designs, and construction shall conform to the latest revisions of the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)
2. American Concrete Institute (ACI)
3. Concrete Reinforcing Steel Institute (CRSI)
4. American Welding Society (AWS)
5. Federal Specifications (FS)
6. Louisiana Department of Transportation and Development (LADOTD)

1.03 SUBMITTALS

A. Submittals and test reports shall be made available to the City of Lake Charles Engineering Department at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Engineering Department for approval prior to acceptance of the improvements. Project record documents shall accurately record locations of sidewalks within rights-of-way or maintenance easements.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the Portland Cement concrete curb and gutter, walks, drives and incidental paving must be:

1. Pre-authorized for construction and subsequent public dedication as part of an

approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications described herein;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located within acceptable rights-of-way to be granted to the City;

6. Accurately depicted in record documents to be submitted.

1.05 QUALITY ASSURANCE

A. Quality Assurance services, duties, test procedures, and test reports shall be in compliance with Section 5 – Portland Cement Concrete Pavement of these Standard specifications.

B. All sidewalk construction shall be constructed to the lines and grades shown on the Drawings. All sidewalks shall be constructed in full compliance with the American with Disabilities Act of 1990, 42 U.S.C. 12101 et seq. Prior to acceptance, the slopes of sidewalks and pedestrian ramps shall be measured to verify conformance with the previously stated standards.

1.06 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the Owner within the guarantee period.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete curb and gutters, sidewalks, drives, and incidental paving materials shall conform to the following sections of Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as modified by these specifications. All materials provided under this specification must be qualified under the LADOTD MATT SYSTEM.

1.	Portland Cement Concrete:	901
2.	Aggregates:	1003
3.	Joint Fillers:	1005.01
4.	Joint Sealants:	1005.02

5.	Joint Seals:	1005.03
6.	Reinforcing Steel:	1009
7.	Curing Materials:	1011.01
8.	Water	1018.01
9.	Form Release Agent:	1018.25

2.02 MIX DESIGNS

A. Concrete curb and gutters and drives paving shall be Type "B" pavement in accordance with the Section 901 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

1. Concrete shall be non-air entrained.

2. Minimum Cement Content (lb/CY) shall be 545 lbs (5.8 Sack mix).

B. Concrete walks and incidental paving shall be Type "M" pavement in accordance with the Section 901 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition.

2.03 PORTLAND CEMENT CONCRETE WALKS

A. Typical Portland cement concrete walks shall be four (4) inches thick and constructed with plain non-reinforced concrete.

2.04 REINFORCED PORTLAND CEMENT CONCRETE WALKS

A. Walks to be placed at intersections, driveways, and at handicap ramps shall be six (6) inches thick and constructed with reinforced concrete. Six (6) inch thick reinforced walks shall extend back eight (8) feet from the curb in any direction at intersections before transitioning to the standard four (4) inch section.

B. Reinforcement for reinforced Portland cement concrete walks shall be 6"x6" W4 – W4 Welded Steel Wire Fabric.

2.05 REINFORCING STEEL

A. Reinforcing steel provided under this specification shall be in accordance with the Section 1009 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, with the following amendments.

1. Flat sheets of welded steel wire fabric mesh will be required, rolled mesh will not be acceptable.

2. Wire for Zig Zag high chairs shall meet the requirements of ASTM A 185 and shall be a minimum of 6 gauge.

2.06 TRUNCATED DOME DETECTABLE WARNING SURFACE (TTDW)

A. Truncated Dome Detectable Warning Surface shall be installed within the walks at all street intersections.

B. Truncated Dome shall be Armor Tile Cast in Place Tactile Detectable Warning Surface, or approved equal. Truncated domes shall be dark grey (Federal Color No. 36118).

PART 3 EXECUTION

3.01 PREPARATION

A. Construct subgrade in conformity with lines and grades shown on drawings and as specified in Section 706 and 707 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition.

B. Do not disturb previously prepared subgrades and subbase course. Where loose soils are encountered beneath pavements, scarify, moisture condition and properly re-compact soils.

3.02 PLACING WELDED STEEL WIRE FABRIC

A. Welded steel wire fabric shall be placed 2-1/2 inches beneath the finished surface of the pavement. Welded Steel Wire Fabric shall be supported on zig zag chairs of the size required to provide 2-1/2 inches of cover from the finished surface of the pavement.

B. At all places where the continuity of reinforcement is required, adjacent sheets of the fabric shall be properly lapped. The transverse and longitudinal wires of the fabric shall be lapped not less than twelve (12) inches.

C. Welded steel wire fabric shall not extend across either transverse or longitudinal joints.

3.03 CONCRETE SIDEWALKS AND INCIDENTAL PAVING

A. Construction requirements including, but not limited to, subgrade preparation, forming, placing and finishing concrete, joints and curing shall be in conformance with Section 706 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as amended herein.

1. Expansion joints shall be installed at maximum 50-foot intervals.

2. The grade or slope along the length of the walk shall be as near parallel to the street gradient as practical. The maximum longitudinal slope shall be 5%, except where a variance from street grade has been approved by the City Engineer. The design cross slope be 1%; with the intention of enforcing a 2% maximum with absolutely no tolerance for exceeding 2%, due to Federal ADA requirements. This maximum cross slope standard also applies when the walk crosses drives and shall slope toward the street.

3.04 WHEELCHAIR ACCESSIBLE CURB RAMP PAVING

A. Wheelchair accessible curb ramps shall be constructed at all street crossings. Design slope of ramps shall be 5% in any direction with an absolute maximum slope 8.33%. The minimum allowable thickness for wheelchair accessible curb ramps shall be six inches and the concrete shall be reinforced. Curbs at ramp locations must provide a gradual transition from gutter line to back of curb, not exceeding 1/2 inch in height or slopes of greater than one inch per foot. Side slopes of ramps shall not exceed one inch per foot where such side slopes are in the normal path of pedestrians on adjacent portions of sidewalk. If the street curb has not been constructed to receive the sidewalk ramp, the sidewalk constructor shall remove a section of the curb and reconstruct as required.

B. All curb Ramps shall be constructed with a Truncated Dome Detectable Warning Surface of the type specified on the plans.

3.05 CONCRETE CURBS AND GUTTERS

A. Construction requirements including, but not limited to, subgrade preparation, joints, placing and finishing concrete, backfilling and curing shall be in accordance with Section 707 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, except as amended herein.

1. Curbs shall be monolithic to the pavement and shall be formed and poured concurrently with the pavement. Pinned on curbs will not be acceptable.

2. The following testing shall be provided in addition to that specified in Section 707:

    a. Test face, top, back and flow line of curb and gutter with a 10 foot straightedge or curbed template, longitudinally along surface.

    b. Correct deviations in excess of 1/4 inch.

    c. Gutters:

        i. Water test gutters having a slope of 0.8 foot per 100 feet or less, and where unusual or special conditions indicate gutter may not drain satisfactorily.

        ii. Water testing consists of establishing flow in length of gutter to be tested by supplying water from a hydrant, tank truck or other source.

        iii. One hour after supply of water is shut off, inspect gutter for evident of ponding or improper shape.

        iv. In the event water is found ponded in gutter to a depth greater than ½ inch, or on the adjacent pavement, correct defect or defects in a manner acceptable to the Engineer.

d. Remove and replace sections of work deficient in depth or not conforming to drawings or specifications.

END OF SECTION

SECTION 7
ASPHALTIC CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing all labor, supervision, materials, equipment, tools, and supplies necessary for constructing a pavement composed of Asphaltic Concrete on a prepared subgrade or base course in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

B. The following Bituminous Pavement Specifications are to be used in lieu of section 501-504 of the LA DOTD Standard Specifications. These specifications are provided by the Louisiana Asphalt Pavement Association, whose expertise shall be relied upon in interpreting them. However, the City Engineer shall make the final determination concerning any conflicts arising from the use of these specifications.

1.02 REFERENCES

A. All materials, designs, and construction shall conform to the latest revisions of the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)
2. American Association of State Highway and Transportation Officials (AASHTO)
3. Federal Specifications (FS)
4. Louisiana Asphalt Pavement Association (LAPA)
5. Louisiana Department of Transportation and Development (LADOTD)

1.03 SUBMITTALS

A. Submittals and test reports shall be made available to the City of Lake Charles Engineering Department at any time during construction, at the request of the department.

B. Accurate construction record documents shall be submitted to the City of Lake Charles Engineering Department for approval, prior to acceptance of the asphaltic concrete roads. Project record documents shall accurately record locations of pavement features within rights-of-way or maintenance easements.

1.04 ACCEPTANCE

A. For acceptance by the City of Lake Charles, the asphaltic concrete roads must be:

1. Pre-authorized for construction and subsequent public dedication as part of an approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications described herein;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives;

4. Subject to satisfactory maintenance guaranty, as determined by the City; and

5. Located within acceptable rights-of-way to be dedicated to the City;

6. Accurately depicted in record documents to be submitted to the City.

1.05 WARRANTY

A. The Contractor shall guarantee all materials furnished by him free from inherent defects for a period of one year from date of final acceptance, with the exception of where more stringent warrantees are stated herein.

B. Any repairs, including labor, made necessary by inherent defects, shall be rendered without cost to the City within the guarantee period.

1.06 EQUIPMENT

A. All equipment necessary for the proper preparation of the subgrade, asphalt production, the laying and finishing of the pavement shall be on the project, in satisfactory working condition, and shall have been inspected and approved by the Engineer before paving operations will be permitted to begin. All equipment shall meet the specific requirements hereinafter set forth. The contractor shall maintain all equipment in satisfactory working condition throughout the construction of the project.

B. All equipment, asphalt, plant, paver, rollers, trucks, etc., used shall be certified in accordance with current Louisiana Department of Transportation and Development procedures.

C. The central mixing plant shall be equipped with an asphalt working tank meeting LADOTD specifications. In addition, there shall be an asphalt storage tank of sufficient capacity to hold enough asphalt for one full day's operation of the plant. The storage tank shall have adequate heating and circulating equipment and insulation to maintain proper uniform temperature.

1.07 QUALITY ASSURANCE

A. Laboratory Services: Laboratory services shall be performed by a commercial laboratory approved by and paid by the Engineer.

B. Duties: The laboratory will review the Contractor furnished design mix to determine compliance with these specifications. The laboratory will inspect and test all materials entering asphalt mix, analyze aggregate for quality, durability, grading and free water content, take representative

specimens of ingredients and mixes. The laboratory shall check the moisture content of aggregate and control the mix. It is the intent of these specifications to have plant and job site laboratory control. Job site laboratory control shall include job mixing, handling, and placing of concrete.

C. Test Procedures: All test specimens shall be taken and laboratory tests conducted in conformance with the latest standard test procedure of the ASTM, as amended to date of contract, and when not covered therein shall be sampled and tested in accordance with the "Standard Specifications for Roads and Bridges" of the Louisiana Department of Highways, 2006 Edition, with subsequent revisions to date of contract. All tests not covered by the above shall be performed as specified by the Engineer.

D. Test Reports: The laboratory shall furnish promptly to the City, Contractor, and the Engineer written reports covering the results of all tests and inspections made.

E. Test Samples: For all projects, 1 sample shall be taken for Marshall Properties testing for each 250 tons or portion thereof produced and 1 sample taken for extracted gradation testing for each 500 tons or portion thereof produced. Five (5) samples shall be taken for determination of pavement density and thickness, with the sampling distribution to be determined by the Engineer.

F. Contractor's Responsibility: It shall be the responsibility of the Contractor to provide the asphaltic concrete mix design, to produce asphaltic concrete of the strength, durability, workability and finish specified, submit the mix design for approval, furnish representative material for specimens in quantities required by the testing laboratory; cooperate and assist in taking samples of materials for testing.

PART 2 PRODUCTS

2.01 GENERAL

A. These specifications are applicable to asphaltic wearing, binder and base course mixtures of the plant mix type.

B. The mixture shall consist of aggregates and asphalt with additives, combined in such proportions as to meet the requirements in Table 1 of this Section.

C. The Contractor shall keep accurate records, including proof of deliveries of all materials for use in asphaltic concrete mixtures. Copies of these records shall be furnished to the City upon request. Each transport load of Asphalt Cement and/or Polymer Modified Asphalt Cement shall be accompanied by a Certificate of Compliance, signed by the material supplier, which shall state that the materials involved comply with specifications. The fact that the material used on the basis of a certificate of compliance shall not relieve the Contractor of responsibility for incorporating material in the work, which conforms to the plans and specifications. Materials to be used must be listed on the current Louisiana Department of Transportation and Development (LaDOTD) Qualified Products List (QPL).

2.02 ASPHALT

A. Asphalt cement Grade AC 30 shall be used, except as otherwise specified herein. Asphalt cement shall conform to the provisions of Subsection 1002.01 of the Louisiana Standard Specifications for Roads and Bridges 2006 Edition and to following Table.

Property	Test Method	Specifications
Penetration, 25°C (77°F), 1OOg, 5 Sec.	AASHTO T 49	55+[2]
Viscosity, 135°C (275°F), SSF3	ASTM E 102	175+
Viscosity, 135°C (275°F), cSt	AASHTO T 201	350+
Viscosity, 60°C (140°F), poises	AASHTO T 202	3000±600
Solubility in Trichloroethylene, %	AASHTO T 44	99.0+
Flash Point, COC, °C (°F)	AASHTO T 48	232 (450)+
Tests on Residue from Thin Film Oven Test:		
Viscosity, 60°C (140°F), poises	AASHTO T 202	12000-
Ductility, 25°C (77°F), 5 cm/min.	AASHTO T 51	100+
Spot Test (Standard Naphtha Solvent)	AASHTO T 102	Neg.

1. All values are inclusive.

2. For samples obtained at point of delivery, the penetration requirement shall be 50+.

3. For samples obtained at point of delivery, the viscosity at 275°F may be determined using ASTM E 102.

4. Storage or working tank temperature will not exceed 325°F.

2.03 POLYMER MODIFIED ASPHALT CEMENT

A. Polymer modified asphalt cement shall consist of an asphalt cement to which a minimum of 3% by weight polymer has been added. The resulting material shall be homogeneous and smooth without detectable strands of polymer and shall meet the following requirements:

Property	Test Method	Specifications
Penetration, 25°C (77°F), 1OOg, 5 Sec.	ASTM D5	Min 50 Max 75
Viscosity, 275°F, cSt	ASTM D2171	Max 2000
Viscosity, 140°F, Poise	ASTM D2171	Min 4000
Flash Point, °F	ASTM D92	Min 450
Solubility in Trichloroethylene, %	ASTM D2042	Min 99.0
Separation of Polymer		

325°F, 48 hours, difference in R & B from top to bottom sample, °F:		Max 4
Ring and Ball Softening Point, °F:	ASTM D36	Min 130
Ductility, 25°C (77°F), 5 cm/min.	AASHTO T 51	100+
Spot Test (Standard Naphtha Solvent)	AASHTO T 102	Neg.

Test for Elasticity	Specifications
Force Ratio (f2/fl,39.2°F, 5 cm/min., 30 cm	Min. 0.3

Tests on Residue from rolling thin film oven test	Specifications
Penetration Retention, %	Min. 50
Elastic Recovery, 77%, 10cm elongation, %	Min 60

2.04 ADDITIVES

A. Silicone

1. Silicone additives, when needed, shall be dispersed into the asphalt by methods and in concentrations given in the QPL.

B. Anti-Strip

1. An anti-strip additive, added at a minimum rate of 0.3% by weight of asphalt cement, shall be thoroughly mixed with the asphalt cement at the plant. This mixture shall yield a Tensile Strength Ration (TSR) equal to or greater than 80 percent as determined by ASTM-D4867-88 including footnote No. 5 (Freeze- Thaw), and shall show stripping of less than 5%. Testing shall be conducted at the beginning of each project and any time the Contractor changes material source. Random tests may be performed during the project.

C. Hydrated Lime

1. When required to meet mix design requirements, hydrated lime shall be added to the mix at the minimum rate of 1.0% by weight of aggregates. A separate bin and feeder shall be provided. Hydrated lime shall be added to the aggregates prior to mixing with asphalt.

2.05 EMULSIFIED POLYMERIZED ASPHALTIC TACK

A. Emulsified Polymerized Asphalt Tack Coat shall consist of a base asphalt cement modified with polymers, which shall then be emulsified. The Emulsified Polymerized Asphalt Tack Coat shall meet the following requirements:

Property	Test Method	Specifications
Viscosity, SSF, at 50°C	AASHTO T 59	100 - 400
Storage Stability Text, 24 hr. %	AASHTO T 59	1-
Settlement, 5 day, %	AASHTO T 59	5-
Classification Test	AASHTO T 59	Pass
Particle Chart Test	AASHTO T 59	Pos.
Sieve Test, Retained on No. 20, %	AASHTO T 59	0.1-
Distillation:		
Oil distilate by vol of emulsion, %	AASHTO T 59	3-
Residue from distilation, %	AASHTO T 59	65+
Test on Residue:		
Penetration, 25°C, 100 g, 5 sec	AASHTO T 49	100 - 200
Ductility, 25°C, 5cm/min, cm	AASHTO T 51_2	125+
Ductility, 4°C, 5cm/min, cm	AASHTO T 51_2	30+
Softening Point (Ring&Ball), °C	AASHTO T 51	38 - 52
Solubility, in Trichloroethylene, %	AASHTO T 44	97.5+
Tensile Stress, 4°C, 500 mm/min at 800 elongation, kg/cm^2	ASTM D 412_2	2.0+
Elastic Recovery, 10°C, 5cm/min, after 20 cm elongation, %	DOTD TR 322_2	58+

1. The addition of latex, rubber or other additives to emulsified polymerized asphalt will not be allowed.

2. The residue asphalt for running ductility tests, tensile stress test and elastic recovery test shall be obtained by means of residue by evaporation (oven) rather than residue by distillation (Aluminum-allow Still). The material supplier shall certify by independent testing that the Tensile Stress requirements have been attained.

2.07 AGGREGATES

A. Aggregates for all asphalt mixtures shall be crushed gravel, slag, or stone approved for wearing courses and conforming to the provisions of Subsection 1003.06 of the Louisiana Standard Specifications for Roads and Bridges 2006 Edition. At the Contractor's option, a maximum of 20% limestone screenings that have a minimum of Number 4 skid rating may be used in all mixes.

B. If the Contractor starts a project using a certain aggregate, the Contractor shall complete the project using that aggregate.

2.08 DESIGN AND QUALITY CONTROL MIXTURES

A. General

1. The Contractor shall be responsible for design, production, transportation and laydown of mixtures. All work shall meet the requirements of this Section and be

subject to acceptance by the Engineer.

2. The Contractor shall exercise quality control over materials and their assembly, design, processing, production, hauling, laydown and associated equipment. Quality control is defined as the constant monitoring of equipment, materials and processes to ensure the mixtures produced and laid are uniform, are within control limits, and meet requirements in Tables 1 and 2 of this Section and other specification requirements. If these specifications are not being met and satisfactory control adjustments are not being made, operations shall be discontinued until proper adjustments and uniform operations are established. Control shall be accomplished by a program independent of, but correlated with a designated testing laboratory and shall verify that all requirements of the job mix are being achieved and that necessary adjustments provide specification results.

3. The Contractor shall conduct such test as are necessary, in addition to the required tests, to design, control and place mixtures within specifications.

4. When the plant is in operation, the Contractor shall have a LADOTD Certified Asphaltic Concrete Technician at the plant or job site who is capable of designing asphaltic concrete mixes, conducting any test or analysis necessary to put the plant into operation and producing a mixture meeting specifications. Daily plant operations shall not begin unless the LADOTD Certified Asphaltic Concrete Technician is at the plant.

B. Job Mix Formula

1. The Contractor shall design the mixtures for optimum asphalt content and comply with requirements of DOTD TR-303, Method A: however, Method B may be used when approved. The job mix formula shall be submitted for approval to the Engineer seven (7) days prior to start of production. No mixture shall be produced until the job mix formula has been approved. The job mix formula will allow the full range of gradation mix tolerances within the mix type specification limits.

2. All mix types with letter “P” in the type designation are to be manufactured using Polymer Modified Asphalt Cement.

3. When aggregates with a water absorption value greater than 2.0% or an asphalt absorption value greater than 0.5%, determined by AASHTO T-84 or DOTD TR-320 respectively, are used in the mixture, the Contractor shall increase the initial optimum asphalt cement content to compensate for the asphalt cement absorbed by the aggregates.

4. The plant shall be so operated as to produce on a continuing basis a mixture conforming to the approved job mix formula, the requirements in Table 1 of this Section and other specification requirements. When this is not the case, the Contractor shall begin making satisfactory adjustments or cease operations.

5. Whenever polymer asphalt is required and for all wearing course mixes, reclaimed asphaltic concrete shall not be permitted in the job mix formula.

6. New aggregates shall be dried and heated to a sufficiently high temperature to produce a mixture with a discharge temperature of at least 290 degrees Fahrenheit. Maximum discharge temperature of asphaltic concrete produced will not exceed 325 degrees Fahrenheit.

7. At least 30% of the total aggregates by weight for Type 91HV and 91HVP mixes shall have a Skid Resistant Rating of I, or at least 50% by weight of the total aggregate shall have a friction rating of II, not more than 10% of these materials shall pass the no. 10 sieve.

C. Aggregate Moisture Content

1. No mix shall be produced when the moisture content of a sample of combined aggregates, taken from the belt feeding the drum/dryer, is equal to or exceeds 8%. The finished asphaltic concrete mixture will be tested for moisture content which must not exceed 0.5%.

TABLE 1
REQUIREMENTS FOR ASPHALTIC CONCRETE MIXTURES

U.S. Sieve % Passing	Type 90 SD	Type 90 WC 90 WCP	Type 90 BC 90 BCP	Type 90 BB 90 BBP	Type 91 HV+ 91 HVP+	Mix Tolerance
l "	100	100	100	80-100	100	+/- 6
3/4"	98-100	95-100	85-100	-	95-100	+/- 6
1/2"	90-100	90-100	70-100	-	80-95	+/- 6
3/8"	70-100	70-100	60-100	-	70-88	+/- 6
No. 4	50-75	50-75	40-70	35-70	50-75	+/- 6
No. 10	32-55	32-55	28-50	-	28-55	+/- 6
No. 40	16-33	16-33	16-33	16-40	14-30	+/- 5
No. 80	10-20	10-20	10-20	-	8-20	+/- 4
No. 200	6-12	6-12	6-12	4-15	3-10	+/- 2
Extracted Asphalt, %	-	-	-	-	-	+/- 0.4
Mix Temperature*	-	-	-	-	-	+/- 10° F
% Cr. Retained on No. 4**	70 Min.	90 Min.	70 Min.	As Needed	90 Min.	
Marshall Stability (Lbs) No. of Blows, Avg. of 4 Test	50	75	75	75	75	
Design	1200	1700	1600	1200	2200	
Minimum	1000	1500	1400	1000	2000	
Indv. Test (min.)	800	1300	1200	800	1800	

Marshall Flow (1/100")	8-18	6-15	5-15	15 Max	6-15
% Voids	2-4	3-5	3-5	3-5	3-5
% VFA	75-85	70-85	70-80	70-80	70-85

* Mix Temperature – (290^{o}F - 325^{o}F) Determined by Job Mix Formula
** As determined by DOTD TR-306

PART 3 EXECUTION

3.01 GENERAL

A. Approved materials shall be installed per their respective sections of the latest edition of the Louisiana Standard Specifications for Roads and Bridges, accept as modified herein.

3.02 WEATHER LIMITATIONS

A. Asphaltic concrete mixtures shall not be applied on a wet surface or when the ambient temperature is below 50 degrees Fahrenheit, except that material in transit or a maximum of 50 tons in the surge bins at the time plant operation is discontinued may be laid; however, mixtures laid shall perform satisfactorily and meet specification requirements. Inclement weather will be sufficient reason to terminate or not begin production.

B. If materials are placed in thicknesses of 2-1/2" or greater, these temperature limitations shall not apply provided all other specification requirements are met.

3.03 SURFACE PREPARATION

A. The surface to be covered shall be approved by the Engineer prior to placing mixtures. The Contractor shall maintain the surface until covered.

B. Cleaning

1. The surface to be covered shall be swept clean of dust, dirt, caked clay and loose material by revolving brooms or other mechanical sweepers supplemented with hand equipment as directed. When mixtures are to be placed on portland cement concrete pavement or overlaid portland cement concrete pavement, the Contractor shall remove excess joint filler from the surface by an approved burning method. The Contractor shall remove any existing raised pavement makers prior to asphaltic concrete overlay operation. All areas to be paved that have vegetation encroachment will be sterilized with an approved soil sterilizer.

C. Applying Liquid Asphaltic Materials

1. Existing Pavement Surfaces: Before constructing each course, an approved asphaltic tack coat shall be applied. The Contractor shall protect the tack coat and spot patch as required.

2. Raw Aggregate Base Course and Raw Embankment Surfaces: The Contractor shall apply prime coat to unprimed surfaces, or protect in-place prime coat and spot patch as required with asphaltic prime coat.

3. Cement and Lime Stabilized or Treated Embankment and Base Course Surfaces: The Contractor shall apply curing membrane if none is in place, or protect the in- place curing membrane and spot patch as required, with asphaltic material.

4. Other Surfaces: Contact surfaces of curbs, gutters, manholes, longitudinal edges and joints, and other structures shall be painted with a uniform coating of asphaltic tack coat before placing asphaltic mixtures.

5. Restoration of Existing Pavement Surface and/or Base: All irregularities, depressions or failures in the existing pavement surface and/or base shall be repaired prior to the placement of any hot-mix asphaltic concrete wearing course surface. In general, surface defects shall be repaired by removing all loose or defective material to sound pavement, and replacing with approved hot-mix asphaltic concrete patching material conforming to Table 1. The hot-mix leveling mixture shall be thoroughly compacted to produce a tight surface conforming to produce a tight surface conforming to the adjacent pavement area.

3.04 JOINT CONSTRUCTION

A. Longitudinal joints shall be constructed by overlapping the paver approximately 2" onto the adjacent pass. Prior to rolling, the overlapped mix shall be pushed back, without scattering loose material over the uncompacted mat, to form a vertical edge above the joint. The vertical edge shall then be compacted by rolling to form a smooth, sealed joint. Longitudinal joints in 1 layer shall offset those in the layer below by approximately 3"; however, the joint in the top layer shall be offset 3" to 6" from the centerline of pavement if the roadway comprises 2 lanes of width, or offset 3" to 6" from lane lines if the roadway is more than 2 lanes.

B. Transverse joints shall be butt joints formed by cutting back on the previously placed mixture to expose the full depth of the course. Transverse joints in succeeding courses shall be offset at least 2 feet. Asphaltic tack coat shall be placed on contact surfaces of transverse joint before mixture is placed against them.

3.05 HAULING, SPREADING AND FINISHING

A. Mixtures shall be transported from plant to paver at a temperature no cooler than 10 degrees Fahrenheit below the lower limit of the approved job mix formula. No load shall be sent out so late in the day as to prevent completion of spreading and compaction of the mixture during daylight, unless artificial lighting has been approved.

B. Each course of asphaltic mixture shall be placed in accordance with the specified lift thickness. If no lift thickness is specified, binder and wearing course mixtures shall be placed in lifts not exceeding 2" thick, unless thicker lifts are permitted. Base course mixtures shall be placed in

lifts of such thickness that all specification requirements are met.

C. With the Engineer's approval, blade graders may be used to fill isolated depressions in the initial layer.

D. Coordination of Production

1. The Contractor shall coordinate and manage plant production, transportation of mix and laying operations to achieve a high quality pavement and shall have sufficient hauling vehicles to insure reasonably continuous plant and roadway operations. The Engineer may order a halt to operations if sufficient hauling vehicles are not available. If less than the optimum number of hauling vehicles are available and it is determined that satisfactory quality can be obtained, the Contractor will be permitted to work provided plant production and hauling vehicles are coordinated to minimize the adverse effect of idle time between loads.

E. Paving Operations

1. Transfer of mixture from haul truck to pavement may be made by direct unloading into the spreader hopper or by use of approved mechanical loading devices. Delivery of material to the paver shall be at a uniform rate and in an amount within the capacity of paving and compacting equipment. Equipment shall be so designed and operated that the finishing machine will place mixtures to required line, grade and surface finish without resorting to hand finishing. Equipment which leaves tracks or indented areas which cannot be corrected in normal operations or fails to produce a satisfactory surface shall not be used. Operation of equipment resulting in accumulation of material and subsequent shedding of accumulated materials into the mixture will not be permitted.

2. All mixtures shall flow though the spreader hopper. Mixtures dropped in front of the spreader shall be either lifted into the hopper or rejected and cast aside.

3. Longitudinal joint and edges shall be constructed along lines established by the Contractor for the paver to follow. The paver shall be positioned and operated to closely follow the established line. Irregularities in alignment shall be corrected by trimming directly behind the paver.

4. After the first load of material has been spread, the texture of the unrolled surface shall be checked to determine its uniformity. The adjustment of screed, tamping bars, feed screws, hopper feed, etc. shall be checked frequently and adjusted as required to assure uniform spreading of the mix to proper line and grade and adequate compaction. If segregation of materials occurs, spreading operations shall be suspended until the cause is determined and corrected.

5. Surface irregularities shall be corrected directly behind the paver. Excess material forming high spots shall be removed. Indented areas shall be filled and finished

smooth. Hand placement for surface repair will be permitted. Material shall not be cast over the surface.

6. If spreading and finishing operations are interrupted to such extent that the mixture remaining in trucks, paver, spreader hopper or on the roadway cools to such extent that it cannot be laid, finished or compacted to the same degree of smoothness and with the same texture and density as the uncooled mixture, the cooled mixture shall be removed and replaced at the Contractor's expense.

7. Mechanical Pavers

   a. Thirty (30) Foot (Minimum) Traveling Stringline: The initial paving strip of each layer of mixture shall be constructed using the traveling stringline and automatic slope control method; however, if permitted, the portion of mixtures required to level isolated depressions in the initial layer may be placed without automatic screed control. After the initial paving strip of each layer is finished and compacted, adjacent paving strips shall be laid to the grade of the initial paving strip using a shoe device or traveling stringline to control grade and a slope control device to control cross slope.

      i. If directed, the traveling stringline shall be used to control grade of adjacent paving strips on all layers. On multi-lane pavements, the sequence of lane construction will be subject to approval.

      ii. If both outside edges of paving strip being placed are flush with previously placed material, the slope control device shall not be used. A grade sensor is required for each side of the paver.

      iii. In superelevated curves, the cross slope shall be changed from that specified for tangents to the specified for superelevation in gradual increments as the paver is in motion so a smooth transition in grade is obtained. The change in cross slope shall be accomplished within the transition distance specified.

   b. Erected Stringline: The initial paving strip of the first layer of mixture shall be constructed using an erected stringline referenced to grade established by the Engineer; however, if permitted, mixtures required to level isolated depressions may be placed without automatic screed control.

      i. Subsequent layers may be constructed by use of the traveling stringline, provided surface and grade tolerances are met on the previous layer.

      ii. Only 1 grade sensor and the slope control devices are necessary for normal crown and tangents. Super elevated curves will require the use of 2 grade sensors and 2 erected stringlines to obtain proper grade and slope; however, if the automatic screed control device is equipped with

a dial or other device which can be conveniently used to change the cross slope in small increments, super elevated curves may be constructed using this device and 1 erected stringline.

iii. After the initial paving strip of the first layer is finished and compacted, adjacent paving strips shall be laid in accordance with heading (1) above.

c. Without Automatic Screed Control: When permitted, pavers without automatic screed control may be used for pavement patching, pavement widening, paved drives and turnouts.

8. Hand Spreading:

a. Where the use of mechanical finishing equipment is not practical, the mix may be spread and finished by hand to the satisfaction of the Engineer. Mixtures shall not be cast from the truck to the grade. During spreading operations, material shall be thoroughly loose and uniformly distributed. Material that has formed into lumps and does not break down readily will be rejected. The surface shall be checked before rolling and irregularities corrected.

9. Curb and Gutter and Integral Curb:

a. On streets having curb and gutter or integral curb where the Asphaltic concrete is to extend to the curb, the cross slope shall be broken to provide an additional 1/2'' drop at the curb line. The break point shall occur between 2 and 4 feet from the curb line. The exact break point shall be agreed upon by the Engineer and the Contractor, considering the capabilities of the type of equipment to be used for laydown.

3.06 COMPACTION

A. After placement, mixtures shall be uniformly compacted, by rolling while still hot, to a minimum 95% density.

B. When polymer asphalt cement is not specified in the mixture a pneumatic tire roller may be used for intermediate rolling; however, when the ambient temperature is below 60 degrees Fahrenheit, it must be used. With polymer asphalt pneumatic rollers will not be permitted. The use of roller which results in excessive crushing of aggregate will not be permitted.

C. The rolling pattern established by the Contractor shall be conducted by experienced operators in consistent sequences and by uniform methods that will obtain specified density and smoothness. Individual roller passes shall uniformly overlap preceding passes to ensure complete coverage of the paving area. The speed and operation of rollers shall be such that no displacement or tearing of the mat occurs. Non-vibrating steel wheel rollers shall be operated with drive wheels toward the paver. Any displacement or tearing of the mat shall be immediately corrected. Finish rolling shall be accomplished with a non-vibrating steel roller until roller marks

have been eliminated.

D. To prevent adhesion of mixture, wheels of steel wheel rollers shall be kept properly moistened, but excess water will not be permitted. Pneumatic tire rollers shall be operated in such manner that tires will retain adequate heat to prevent mix from adhering to tires. The pneumatic tire roller shall be operated at a contact pressure which will result in a uniform, tightly-knit surface. The pneumatic tire roller shall be kept approximately 6" from unsupported edges of the paving strip; however, when more than 1 paving strip is down, the adjacent paving strip shall be overlapped approximately 6 inches.

E. If continuous roller operation is discontinued, rollers shall be moved to cooled areas of the mat, where they will not leave surface indentions.

F. Vibratory rollers may be used provided they do not impair the stability of the pavement structures of underlying layers. If mix is placed on newly constructed cement or lime stabilized or treated base, sub-base or working table, vibratory rollers shall not be used for at least 7 days after such stabilization or treatment.

G. Along forms, curbs, headers, wall and at other places inaccessible to rollers, mixtures shall be uniformly compacted to the satisfaction of the Engineer with hot hand tampers, mechanical tampers, or other approved methods.

H. Surface mixtures after compaction shall be smooth and true to cross slope and grade within the tolerances specified. Mixtures that become loose, broken, contaminated or otherwise defective shall be removed and replaced with fresh hot mixture compacted to conform with the surrounding mixture.

I. Newly finished pavements shall be protected from traffic until they have sufficiently hardened.

J. Newly finished pavements, after finish rolling, shall have uniform, tightly-knit surface free of cracks, tears or other deficiencies. Ripples in the mat surface will not be accepted. All deficiencies shall be corrected at the Contractor's expense and the Contractor shall adjust his operations to correct the problem. This may require the Contractor to adjust the mix or furnish additional or different equipment.

3.07 PAVEMENT SAMPLES

A. The Contractor shall furnish samples cut from the complete work. The removed pavement shall be replaced with new mixture and refinished within 24 hours. No additional compensation will be allowed for furnishing test samples and replacing the areas with new pavement. Samples shall be taken by the Contractor in the presence of Engineer's representative from areas selected by the Engineer. However, cores less than 1-1/2" thick shall not be used as pavement density. Samples shall be cores approximately 4" in diameter taken by an approved core drill.

B. Core holes must be filled the next work day after being cut. Core holes must be dry and tack coat applied prior to filling. The mix used for filling must be the same as where the core was

made. The core hole will be overfilled and then rodded 25 times. The mix in the hole will be shaped and crowned 1/4" higher than the roadway surface. The mix in the core hole will compacted with a 10 lb. hammer. Mix in the hole will be considered compacted after receiving a minimum of 25 blows with the hammer. After compactions, the core hole top must be equal to or slightly higher than the roadway surface.

C. In the event that the Contractor fails to satisfactorily fill and refinish test sample holes within 24 hours, the Engineer may suspend all other operations on the project until such time as the test holes have been satisfactorily filled and refinished.

3.08 SURFACE FINISH REQUIREMENTS

A. Testing for surface tolerances as outlined in Table 2 of this section will be the responsibility of the Engineer of Record. The Contractor shall furnish the Engineer assistance, as directed, in pulling the rolling straightedge. Control checks will be the responsibility of the Contractor. The Contractor shall furnish a 10-foot rolling straightedge for longitudinal testing and a 10- foot metal static straightedge for traverse testing, both of which shall be acceptable to the Engineer. The rolling straightedge shall be calibrated and used in accordance with DOTD TR-603 and TR-618.

B. For the purpose of the surface finish requirement, the wearing course is defined as the last course placed and the binder course is defined as the last course placed prior to the wearing course. The surface finishes for binder and wearing courses shall meet the requirements as specified in Table 2 of the this section.

TABLE 2
SURFACE FINISH VARIATION (INCHES)

	Longitudinal*	Transverse	Cross Slope**	Grade
Wearing Course	1/8	1/8	3/8	1/2
Binder Course	1/4	1/4	1/2	1/2

*Longitudinal measure based on a 10-foot rolling straightedge
**Cross Slope measure based on 10-feet

1. Longitudinal Surface Finish

   a. The finished surface will be tested by the Engineer in the longitudinal direction for conformance to surface finish requirements in Table 2 of this section. One path in each lane will be selected at random and tested.

   b. Longitudinal variations in binder course surfaces shall be subject to the provisions of Table 2 of this section. Any surface finish deficiency that exceeds 3/8" shall be corrected in accordance with item 5 of this subsection. Longitudinal variations in the final wearing surface will be subject to provisions of Subsection 3.10.2.a.i. Surface finish deficiencies exceeding 1/4" shall be corrected in accordance with item 5 of this subsection. After corrections have been made, the mix laid that day will be subject to the provisions of Subsection 3.10.2.a.i.

2. Transverse Surface Finish

a. The transverse surface finish shall be so controlled that the values shown in Table 2 will not be exceeded. The surface for binder and wearing courses will be tested at selected locations by the Engineer in the transverse direction for conformance to surface finish requirements of Table 2 of this Section. Corrections shall be made as directed in accordance with item 5 of this subsection.

3. Cross Slope

a. The cross slope shall be so controlled that the values shown in Table 2 of this section will not be exceeded. Cross slope variations allowed in Table 2 shall apply to each lane constructed. Tests shall be run at selected locations, using a stringline, slope board or other comparable method

4. Grade

a. Grade variations shall be so controlled that the tolerance shown in Table 2 of this section will not be exceeded. Tests for conformance shall be run at selected locations, using a stringline or other comparable method.

b. If the pavement is consistently above or below the established grade for reasonable long segment, the Engineer may, for the purpose of determining conformance to the tolerance, use a new grade approximately parallel to the established grade; in which case, any required transition in grade or vertical curve at each extremity of the segment shall be in accordance with the base design requirements. Grade tolerances shall apply to only 1 longitudinal line, such as the centerline or the outside edge of pavement. Corrections shall be made in accordance with item 5 of this subsection.

5. Correction of Deficient Areas

a. Deficiencies to be corrected in the final wearing course shall be corrected by milling, removing, and replacing, or furnishing and placing a supplemental layer of wearing course mixture at least l " thick for the full width of the roadway; all in a satisfactory manner at the Contractor's expense. Deficiencies to be corrected in a satisfactory manner at the Contractor's expense. Deficiencies to be corrected in binder courses shall be corrected in a satisfactory manner at the Contractor's expense. Corrections shall be made before subsequent courses are constructed.

b. With the written permission of the Project Engineer, deficiencies in Longitudinal and/or Transverse Surface Finish may be corrected by heating and re-rolling the surface. Devices used to heat the asphaltic concrete shall not

expose the surface to open flame.

3.09 DIMENSIONAL REQUIREMENTS

A. Thickness

1. Thickness of mixtures will be determined by random coring. Under thickness shall not exceed 1/4". For all mixtures except the final surface course, areas with under thickness in excess of the 1/4" shall be corrected to plan thickness at the Contractor's expense by furnishing and placing additional mixture. For all mixtures except the final surface course, areas with under thickness in excess of the 1/4" shall be corrected to plan thickness at the Contractor's expense by furnishing and placing a supplemental layer of wearing course mixture at least 1-1/2" thick over the entire area for the full width of the roadway.

B. Width

1. The width of completed courses will be determined in accordance with DOTD TR-602. Underwidths shall be corrected to plan width at the Contractor's expense by furnishing and placing additional mixture.

3.10 ACCEPTANCE REQUIREMENT

A. All inspection procedures, including sampling and testing, form the basis for acceptance of the asphaltic concrete. Sampling and testing shall be accomplished following a stratified sampling plan; times and locations shall be set by the Engineer. The location of the area to be cored will be determined by the use of "random number tables" transversely and longitudinally in each subsection of each lot. The procedure used will be in accordance with Louisiana Department of Transportation and Development publication entitled, "Application of End Result Specifications for Asphaltic Concrete." Any section of pavement that is obviously deficient shall be satisfactorily corrected or replaced.

B. Acceptance testing for Marshall Stability and aggregate gradation will be conducted on the mix laid each day on the project. Also acceptance testing for pavement density, surface tolerance and dimensional tolerances will be conducted on mix produced and laid for the City each day.

C. Pavement density and surface tolerance requirements will not be applied for short irregular sections, such as drives, aprons and turnouts; however, mix shall be placed in such manner as to provide a neat, uniform appearance and shall be compacted by satisfactory methods.

D. For all projects, 1 sample shall be taken for Marshall Properties testing for each 250 tons or portion thereof produced and 1 sample taken for extracted gradation testing for each 500 tons or portion thereof produced. Five (5) samples shall be taken for determination of pavement density, with the sampling distribution to be determined by the Engineer.

1. Inspection

   a. Mix exhibiting deficiencies before placement, such segregation, contamination, lump non-uniform coating, excessive temperature variations or other deficiencies, apparent on visual inspection, shall not be placed.

   b. Mix exhibiting deficiencies during placement, such as segregation, contamination, alignment deviations, variations in surface texture and appearance or other deficiencies, apparent on visual inspections, will not be accepted. Poor construction practices such as handwork, improper joint construction, or other deficiencies, apparent on visual inspection, will not be accepted.

   c. Deficiencies revealed by visual inspection after placement and before final acceptance shall be corrected at the Contractor's expense.

   d. If requested by the Contractor, the acceptability of fixtures or work rejected by visual inspection of the inspector will be evaluated by tests, measurements and/or visual inspection by the Engineer.

2. Sampling and Testing:

   a. The City will review the test results from the tests outlined in these specifications to ensure that the asphaltic concrete conforms to City standards, which includes mix design limits, typical sections, material values, surface deviations and verification of control testing. Deviations from specified tolerances will not be accepted. If a sample or test indicates a deviation from the specified tolerance, the Contractor shall take immediate corrective action, or operations shall be discontinued.

      i. Marshall Stability: When individual tests or the average of tests representing the mix produced and laid for the City is outside acceptance limits shown in Table 1 of this Section, the City shall have the right to reject the completed works.

      ii. Aggregate Gradation: Testing for aggregate gradation will be conducted by the Contractor's technician. Gradation testing shall be performed for each 500 tons or portion thereof produced per day.

      iii. Pavement Density: Upon completion of compaction, 5 pavement samples shall be obtained in accordance with subsection 501.09 within 24 hours after placement. If this falls on the day the Contractor's crews are not working, sampling will be done the following working day. If the Contractor does not obtain the roadway samples as outlined, the Engineer may deduct 5% of the contract price of asphaltic concrete for

the day or days run, where samples are late or lacking. The density requirement for the average of 5 samples 95% density, determined in accordance with DOTD TR-304.

iv. Surface Smoothness: Testing for surface smoothness will be required on the final wearing surface. The surface will be tested longitudinally with a 10-foot rolling straightedge within the time period prescribed in Heading iii above. The rolling straightedge shall be furnished by the Contractor. Surface corrections shall be made in accordance with Subsection 3.08. The requirements for surface tolerance shall be as shown in Table 2 of this section.

END OF SECTION

SECTION 8

SANITARY SEWER LIFT STATIONS

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing labor, materials and services for the construction of a sanitary sewer lift station, complete with all piping, electrical, pumps, fence, painting, landscaping, the required valves, valve box, wet well, ultrasonic level controls, excavating, backfilling, finished site work, etc., and any other items necessary to provide a complete system which functions properly.

B. It is the intent of the specifications that the Contractor furnish and install all facilities necessary for the complete and operable systems for the project whether described in detail or not, except for those items specifically stated as presently existing or furnished and/or installed by Owners or by others.

C. All stations shall have a minimum of two pumps of equal capacity. The pumps shall be solids handling, submersible type centrifugal pumps capable of meeting the design flow. The pump manufacturer shall be responsible for supplying the pump, motor, discharge elbow, anchor bolts, guide rails, and all miscellaneous stainless steel hardware required to place the submersible pump within the wet well. Submersible pumps shall be removable for inspection or service without entering the wet well. Access hatches shall be provided for wet well and valve vault access and shall be lockable with recessed hatch.

D. The lift station piping shall allow an emergency bypass of the lift station wet well. In general, this involves placing a tee with a valve and quick connects on the discharge side of the shutoff valves.

E. Each pump shall have an individual discharge pipe complete with flanged coupling adaptor, check valve, and shut off valve.

F. Lift station sites shall be designed with a concrete driveway apron to access the site. The entirety of the site shall be paved with concrete pavement. Site fencing shall be installed on top of or within the limits of the site paving.

1.02 REFERENCES

A. All materials, equipment, and designs shall conform to the requirements of these specifications. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. Louisiana Department of Health and Hospitals (LADHH)

2. American Society for Testing and Materials (ASTM)

3. American Concrete Institute (ACI)

4. Concrete Reinforcing Steel Institute (CRSI)

5. American Welding Society (AWS)

6. Fiberglass Tank and Pipe Institute

7. American National Standards Institute (ANSI)

8. American Water Works Association (AWWA)

9. The Society for Protective Coatings (SSPC)

10. Hydraulic Institute (HI)

B. The same manufacturer shall supply all like materials and equipment of the same class, unless specified to the contrary.

C. All products shall bear UL labels where standards have been set for listing.

1.03 SUBMITTALS

A. Submit four (4) sets of shop drawings or cuts, diagrams, performance curves, and engineering data for the items to be furnished under this section. Two (2) sets are to be submitted to the Owner, and if City of Lake Charles' acceptance is required, two (2) sets are to be submitted to the Wastewater Division.

B. Submittals shall not only cover the major components (pumps, motors, etc.), but individual devices as well (piping valves, wet well materials of construction, access hatches, etc.).

C. Submittals shall be provided for the Operation and Maintenance Manuals prior to final issuance of these documents.

1.04 ACCEPTANCE

A. For acceptance of the lift station by the City of Lake Charles, the lift station:

1. Must be complete with a SCADA system.

2. Must be satisfactorily operated by the City's Wastewater Division for a period of one year. During this one year trial period, all repairs, replacements, parts, labor, and service will be at the expense of the Owner. At the end of one year of satisfactory service, the Superintendent, or representative, of the Wastewater Division will recommend that the City formally accept the lift station.

3. Must be accepted through a formal transfer of ownership which is specifically approved by ordinance or controlled through the subdivision review and approval process.

B. In order to be considered for acceptance by the City, a privately built sewer lift station must be:

1. Pre-authorized for construction and subsequent public dedication as part of an

approved development plan or preliminary subdivision plat;

2. Constructed to City standards and specifications established by the Wastewater Division;

3. Approved upon completion for conformity with standards and specifications by appropriate city personnel or representatives.

4. Accurately depicted in construction record documents submitted to and approved by the City of Lake Charles Wastewater Division.

5. Subject to satisfactory maintenance guaranty or pre-acceptance operating test period, as determined by the City.

6. Located on acceptable rights-of-way or readily accessible maintenance easements to be granted to the City.

C. It is the intent of the City to minimize the number of lift stations transferred to the City, and any such facilities which serve only one development should be designed to remain in private ownership and operation. If transfer of such a limited service lift station to the City is necessary to assure satisfactory operation and protection of public health, the transfer instruments shall require compensation of subsequent city operating costs by the user(s) of the facility.

1.05 MAINTENANCE AND OPERATING INSTRUCTIONS

A. The contractor shall prepare a hardback binder of all mechanical equipment furnished by him on the project. The binder shall include shop drawings and operating and maintenance instructions of such equipment. Information shall be printed or typewritten, neatly folded to approximately 8-1/2 x 11 size and filed or bound in as many sturdy manila folders as required to contain the materials. Each binder shall be properly identified. Upon completion of the binder, the Contractor shall turn two (2) copies over to the owner and two (2) copies to the Wastewater Division, if City acceptance of the lift station is required.

1.06 WARRANTY

A. The Contractor shall guarantee all equipment furnished by him free from inherent mechanical, structural, and electrical defects for a period of one year from date of final acceptance.

B. Any replacement of parts, or adjustments, including labor, made necessary by inherent mechanical, structural, or electrical defects, shall be rendered without cost to the Owner within the guarantee period.

C. The pump manufacturer shall guarantee for one year, from date of final acceptance, that all equipment supplied will be free of defects in design, material or workmanship. Said guarantee shall be furnished to the owner in writing. In the event a component fails to perform as specified or is proven defective during the first year, a replacement part shall be provided without cost to the Owner. This warranty covers all electrical and mechanical equipment supplied.

D. In order to assure proper performance and compatibility of interacting components within the intent of the specifications, the pumps, control panel, and warranty shall be supplied by the

same manufacturer.

PART 2 PRODUCTS

2.01 PUMPS

A. Pumps shall be non-clog submersible, or approved equal, capable of passing a minimum 3" diameter solid. The selected pumps should be able to pump at a minimum efficiency of 60%. In addition, the engineer shall verify that the NPSH available is always at least 5' greater than the NPSH required.

B. Furnish and install one (1) duplex pump station. System shall include two submersible pumps with hydraulic sealing flanges; pump rail guides; stainless steel guide rails; pump mounting plates with discharge elbow and rail supports; aluminum access frame with covers, and guide rail supports; stainless steel pump lifting cables with hooks; wiring bracket; and Nema 4X pad lockable weatherproof enclosure.

C. Pumps shall be designed to pump unscreened raw sewage and pass a minimum 3 inch solid. Impellers shall be hydraulically and dynamically balanced and shall be two port non-clog type. Pumps shall be fitted with replaceable wear rings and have two mechanical seals with oil chamber between the seals. Rotating seal faces shall be carbon and stationary faces shall be ceramic.

D. Pumps shall be equipped with a minimum of twenty feet of power and/or control cord respectively.

E. Discharge of each pump shall be equipped with a hydraulically sealed leak proof flanged discharge.

F. All metal seal parts and fasteners shall be 303 stainless steel. The seal chamber shall be fitted with electrode probe and signal box to indicate water in seal chambers.

G. Accepted pump manufacturers: Hydromatic, Fairbanks Nijhuis, Flygt, and ABS. Other manufacturers must be approved by the Wastewater Division prior to acceptance by the City.

2.02 PUMP MOTOR

A. Pump motor shall be of the sealed submersible type for 3 phase electrical power. The motor shall be designed for continuous duty capable of minimum of ten (10) starts per hour.

B. Motor shall be supplied with heat sensing unit attached to motor windings to stop motor in the event it overheats. Motors shall not be overloaded at any point on the curve and shall have the rotative speeds as scheduled on the drawings. Motor shall also be provided with seal fail sensor.

C. The submersible motor shall be FM Listed for class 1, Division 1, Group C & D explosion proof location as defined by the National Electric Code.

2.03 DISCHARGE ELBOW AND GUIDERAILS

A. The pump base and guide rail system shall include 2-125 pound flanged cast iron discharge elbows, 2-cast iron connecting flange assemblies, 2-stainless steel guide connectors, 2-stainless steel upper guide brackets, 2-Stainless Steel pump lifting cables, 1-Stainless Steel float mounting bracket and 4-stainless steel guide rails.

2.04 DUCTILE IRON PIPE AND FITTINGS

A. Piping shall be sized so that the maximum discharge velocity does not exceed eight feet per second.

B. All exposed piping shall be flanged ductile iron and shall be new and unused. Ductile iron pipe shall be manufactured in accordance with A.N.S.I. A21.51 and designed in accordance with A.N.S.I. A21.50 minimum Class 50 or Class 53 for flanged piping.

C. Ductile iron fittings shall be compact unless otherwise specified and conform to AWWA Standard C-153. Fittings shall also meet ANSI 21.10, 250 psi rating.

D. Flange gaskets shall be 3.2mm (1/8") thick acrylic or aramid fibers bound with nitrile for all sizes of pipe. Gaskets shall be full-face type with pre-punched holes.

E. All ductile iron pipe shall have a ceramic epoxy interior lining. The Epoxy ceramic lining shall be a two component amine cured novalac epoxy of at least 87 percent solids. Lining material shall be Protecto 401 by Induron Coatings, Birmingham, AL, or prior approved equal, and shall be installed in accordance with the manufacturer’s recommendations.

F. Flanged pipe and fittings within the wetwell and valve vault shall be supported in order to avoid excessive stress to flanges and to allow for routine maintenance.

G. Exterior surfaces of exposed ductile iron pipe and fittings shall be coated as provided in Section 2.14 below.

H. Direct buried ductile iron pipe and fittings shall be installed with a polyethylene encasement. Polyethylene encasement shall conform to AWWA C-105 or ANSI A21.5. Film shall be Class “C”-Black, with a minimum nominal thickness of 0.008 inches (8 mils).

2.05 VALVES

A. Unless otherwise noted, valves shall be manually actuated; non-buried valves shall have an operating wheel, handle or lever mounted on the operator; buried valves and those with operating nuts shall have a non-rising stem with an AWWA 2-inch nut. At least two tee handles shall be provided for all operating nuts.

B. Each operating device shall have cast on it the word "OPEN" or "CLOSE" and an arrow indicating the direction of operation.

C. Air-Cushioned Swing Check Valves

1. The check valve shall prevent backflow of the pumped liquid on normal pump shut off or power failure, at zero velocity, and be watertight.

2. Air-Cushioned Swing Check valves for raw sewage shall be flanged and shall be as manufactured by Golden Anderson, Val-Matic, or approved equal.

D. Plug Valves

1. Plug valves shall be provided for pump and forcemain isolation. Plug valve shall be designed for buried service or exposed service depending upon the installation location.

2. Plug valves for raw sewage shall be as manufactured by Golden Anderson, or approved equal.

E. Flapper Valves

1. Flapper valves shall be installed on the valve vault drain line in the location where the line enters the wet well.

2. Flapper valves shall be Tide Flex Check Valves, as manufactured by TideFlex Technogies, or approved equal.

2.06 PIPE PENETRATIONS

A. All penetrations into the lift station wet well and valve vault shall be water-proof.

B. Where the valve vault and the wet well are to be constructed using cast in place reinforced concrete, it is recommended that pipe penetrations use manufactured wall pipe or other approved method.

C. Where the valve vault and the wet well are to be constructed using pre-cast structures, the pipe penetrations shall be provided with a modular seal, as manufactured by link-seal or approved equal.

D. Where electrical conduit must pass through concrete walls, use wall sleeves or core through walls and provide waterproof and gas proof seals using link seals, or other approved method.

2.07 EMERGENCY BY-PASS CONNECTIONS

A. The lift station piping shall be provided with emergency bypass of the lift station wetwell.

B. The emergency bypass shall consist of a buried isolation valve located on the discharge forcemain downstream of the valve vault, a buried TEE with an above grade mounted isolation valve and quick connect.

C. The emergency by-pass connection shall be provided in a location convenient approved by the Engineer and suitable for ease of connection. Quick Connect Couplings shall be Dover Corporation, OPW Division Model PF-C coupler with Model 634A plug.

2.08 FLEXIBLE CONNECTIONS

A. A flexible connection, consisting of a flange coupling adaptor, shall be installed on each pump's discharge piping between the valve vault wall and the check valve in order to allow for removal

and maintenance of valves and fittings.

2.09 HARDWARE

A. Hardware used within the wetwell, to include pipe supports, pump guide rails, pump lifting chains, pipe fasteners, anchor bolts, clasps, etc., shall be stainless steel.

B. All bolts for flanged shall be corrosion resistant cast iron alloy such as USALLOY by U.S. Pipe, CORTIN by U.S. Steel, or approved equal. Fittings are to be polyethylene lined as specified herein.

2.10 WET WELL

A. Pumps and equipment shall be installed in a concrete wet well, complete with padlockable access hatches.

B. Pre-cast reinforced concrete wet well riser sections shall conform to ASTM C-76, Class Ill, Wall B.

C. Wet-well riser section joints shall be made with gasketed joints. Gaskets shall conform to ASTM C-443.

D. Concrete wet-well walls and ceiling shall be coated as specified in Part 2.13 of these specifications.

E. Construct the top and bottom slabs of the wet well using a minimum of 560 lbs of cement per cu. yd., 4000 psi @ 28 day compressive strength concrete with not more than 15% fly ash substitution. Reinforce top slab with #5 bars at 6" o.c. each way, top and bottom. Reinforce bottom slab with one layer of #5 @ 6" o.c. each way in top. Reinforce opening around access match opening with 16 #5 bars placed diagonally in pairs around opening, 4 pairs in top and 4 pairs in bottom. Space pair 6" o.c. horizontally.

F. Exterior Waterproofing

1. Prior to backfilling exterior joints shall be waterproofed as provided below.

2. Wet well exterior joints shall be sealed with an external rubber sleeve similar to the Infi-Shield Gator Wrap as manufactured by Sealing Systems Inc. The seal shall be made of a Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils and 12-inch width. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils. The seal shall be designed to stretch around the joint and then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive. Gator Wrap forms a continuous rubber seal on a manhole joint which prevents water and soil from infiltrating through the manhole, catch basin or concrete pipe joint. The exterior joint sealants shall be installed per the manufacturer’s recommendations.

2.11 VALVE VAULT

A. Valve manifold shall be installed in a concrete valve vault, complete with a padlockable access

hatch. Valve vault shall be sized to accommodate 8-inch of clearance between all inside walls and valves/fittings.

B. Construct valve box using a minimum of 560 lbs of cement per cu. yd., 4000 psi @ 28 days compressive strength concrete with not more than 15% fly ash substitution. Reinforce valve box walls, top and bottom slabs with one layer of #4 @ 8" o.c. each way.

C. Construct bottom slab 12" below bottom of force main fittings. Provide a minimum of 6" clear from wall to face of force main flanges. Provide 12" clear from sidewalls of box to pump discharge lines.

D. Valve box top slab to be complete with an access hatch, with a minimum 30" x 48" clear opening.

E. Locate access cover and frame to provide access to check valves and plug valves for operation and maintenance.

F. The slope of the valve vault floor shall drain all water to a discharge pipe penetration which will drain back to the wet well. Drain line shall be schedule 80 PVC and shall incorporate a duckbill style check valve to prevent sewer gases from entering the valve vault.

G. Concrete valve vault walls and ceiling shall be coated as specified in Part 2.13 of these specifications.

2.12 ACCESS HATCHES

A. Access hatches shall have single or double leaf doors as indicated by the Drawings. The doors shall be 1/4-in aluminum diamond pattern plate with welded stiffeners, as necessary, to withstand a live load of 300 lbs/sq ft with a maximum deflection of 1/150th of the span. Hatches shall have a 1/4-in aluminum channel frame with a perimeter anchor flange or strap anchors for concrete embedment around the perimeter. Unless otherwise noted on the Drawings, use pivot torsion bars for counterbalance or spring operators for easy operation along with automatic door hold open. Hardware shall be durable and corrosion resistant with Type 316 stainless steel hardware used throughout. Provide removable lock handle. Finish shall be the factory mill finish for aluminum doors and frames with bituminous coating on the exterior of the frames in contact with concrete. Hatches shall be watertight and have a 1-1/2-in drainage coupling to the channel frame. Access hatches shall be Types as indicated on the Drawings by Bilco Company, New Haven, CT or equal.

B. In instances where The City of Lake Charles Waste Water Department, determines that waterproof hatches shall be required they shall be of the make and quality stated above and shall expel water when fully submerged.

2.13 CONCRETE INTERIOR COATING

A. The interior concrete wet well and valve vault, including ceilings, shall receive a multi-component stress panel lining system, using a mechanical anchoring system at all terminations.

B. The liner shall be installed according to the manufacturer's recommendations.

C. The interior lining system shall be SpectraShield, as manufactured by CCI Spectrum, Inc., or approved equal.

2.14 FERROUS METALS COATING

A. Surfaces of equipment and ferrous surfaces submerged or exposed including, but not limited to, ductile iron piping, fittings, valves and pumps shall be coated with a two part epoxy coating system applied to at least 16 mils dry film thickness.

B. Two part epoxy coating system shall be Carboline 890, as manufactured by Carboline Coatings Company, or approved equal.

2.15 SITE PAVING

A. Concrete paving for site access driveway and the interior site paving shall be 6-inch reinforced concrete paving complying with Section 5 Portland Cement Concrete Paving of these standard specifications.

PART 3 EXECUTION

3.01 GENERAL

A. Coordinate with other trades, equipment and systems to the fullest extent possible.

B. Take all necessary measurements in the field to determine the exact dimensions for all work and the required sizes of all equipment under this contract. All pertinent data and dimensions shall be verified.

C. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.

D. Standard factory testing shall be performed on the equipment provided in this section.

3.02 TRENCHING AND EXCAVATION

A. Excavation

1. Excavation shall include the removal, handling, re-handling, refill or backfilling, and disposal of any and all materials encountered in the work, and shall include all pumping, bailing, drainage and sheeting and bracing, and trench box. The work of excavation shall also include the responsibility of added expenses or other liability that may arise from quicksand, obstacles or conditions, foreseen or unforeseen, which may be encountered in the work. It includes clearing and the removal of pavements, curbs, sidewalks, shrubbery, and other obstructions not otherwise provided for.

B. Dewatering

1. The Contractor shall at all times during construction provide proper and satisfactory means and devices for the exclusion of water or removal of all water entering the

excavation and shall remove all such water as fast as it may collect in such a manner as shall not interfere with the prosecution of the work.

2. No water shall be diverted into any operating sewer line.

3. The Contractor shall use due vigilance and care so that no water originating on his work or due to his work or which he is obligated to handle and dispose of under this contract shall discharge or be discharged on the work or into the trenches of another contractor unless a mutual agreement by the parties affected has been reached. Nothing in this section is to be construed as preventing the reasonable use by the Contractor of any ditch, channel, storm drain, or gutter which is designated and used for City or Parish drainage.

4. The Contractor shall keep the completed sewer lines free of water at all times and until final acceptance.

C. Maintenance of Excavation

1. The Contractor shall maintain all excavation in good order during the construction, so as not to hinder or injure the pipe laying, masonry, or other work. He shall take all reasonable precautions to prevent movement of the sides of such excavation, and shall remove at his own expense any material sliding into the excavation.

D. Sheeting and Bracing

1. The Contractor shall furnish and put in place such sheeting and bracing as may be required to support the sides of all trenches or other excavations and, where required, remove, or cut off, as directed, such sheeting at his own expense. A steel trench box, supplemented with additional sheeting, may be used in lieu of total sheeting and bracing.

E. Disposal of Excavated Material

1. All material excavated shall be placed so as to interfere as little as possible with public travel. In case the street is not wide enough to allow the dirt to be piled up without blocking the sidewalk, the Contractor shall, at his own expense, maintain an open passageway not less than two and one-half feet (2 ½') wide on the sidewalk and shall keep this passageway free from mud and slush.

2. The Contractor may deposit excavated materials directly in permanent position insofar as is consistent with the proper prosecution of the work. Materials that cannot be placed at once in permanent position shall be deposited in temporary storage piles. All this work shall be done with reasonable neatness and excavated materials shall not be carelessly strewn over the area.

3. Surplus excavated material over and above that required for backfilling, mounding over the pipe and making other fills and embankments to the finished lines and grades indicated on the drawings shall be disposed of as directed by the Engineer. The Contractor shall be responsible for seeing that the material is dumped in an orderly manner within the limits designated. The surface of the dump shall be neatly graded to

blend with the natural contours of the existing ground surface. If the City or Drainage Board has no use for the surplus material, it will be the responsibility of the Contractor to properly dispose of said surplus.

3.03 WET WELL AND VALVE VAULT INSTALLATION

A. Concrete wet wells and valve vaults shall be installed on a structural base, as designed by the Engineer of Record. All construction shall be conducted in a dry excavation. Running water shall not be permitted over newly poured concrete. The excavation shall be kept dry until the concrete or mortar has developed sufficient strength to prevent rupture by groundwater pressure.

3.04 BACKFILL

A. General

1. No backfilling of trenches shall be done until the pipe work to be covered has been inspected. Where any sheeting or bracing is withdrawn as backfilling progresses, all voids or spaces left thereby shall be carefully and thoroughly filled and compacted with proper tools.

2. Material for backfill shall contain no rubble, trash, broken concrete, asphalt or other objectionable materials.

3. The Contractor shall be responsible for the stability of all backfill made under the contract until one year after final acceptance of the work and shall bear the expense of replacing any portions which have become displaced due to carelessness or negligent work on the part of the Contractor.

4. Sand shall be carefully placed in six inch (6") layers in the trench so as not to move the pipe or dislodge any of the jointing material and thoroughly, but carefully compacted under or to the level as directed by the Engineer, and around the pipe to 12" over the top of the pipe. The utmost care shall be taken not to disturb the pipe by stepping on or near it or by throwing earth upon it from the bank above, or not to shift a pipe from its proper position by careless or unskilled ramming around it or by unequal filling on the sides.

5. Equal and similar care shall be exercised in filling up above the top of the sewer pipe.

B. Compaction

1. Where a trench is in a highway or city street right of way, backfill for the balance of the trench above a point one foot (1') above the top of the sewer shall be compacted by placing in layers of not more than eight inches (8") thickness and compacting with mechanical tampers or by any satisfactory method or methods that will obtain density hereinafter specified. The density of compacted material in each layer of backfill shall not be less than ninety percent (95%) of the maximum density as measured by Method A of AASHO Designation T-180 (Modified AASHO Test).

2. Where a trench is in open ground and not in a highway or street right of way, the

balance of the trench above a point one foot (1') above the top of the sewer may be filled and compacted by approved equipment or mechanical tampers to obtain density equal to that of the adjacent undisturbed soil, and the surface mounded over the top to provide for some after-settlement. About two months after completion of this type of backfilling, the Contractor shall go over the trench again with a roller, refill to the surface of the ground, and re-roll or tamp to a satisfactory condition. The final surface shall be left in a condition equal to that originally found at the start of the work.

3. In those portions of the backfill which are adjacent to structures, or are for other reasons, inaccessible to the equipment used, the Contractor shall use mechanical tampers approved by the Engineer to obtain the specified density. Backfill shall be carefully placed so as to be equally distributed on all sides of the structure and so as not to damage the structure in any way.

4. Pavement repair shall otherwise be in accordance with Section 6 – Portland Cement Concrete Roads.

5. The Contractor shall maintain the backfill for a period of one year after final acceptance and shall restore any backfill that fails and repair any pavement or other structures which may be damaged as a result of backfill failure.

C. Clean-Up and Removal of Excess Materials

1. The Contractor shall not, without the permission of the Engineer, remove from the line of work any earth excavated therefrom which may be suitable for backfilling or surfacing until the excavation has been refilled and surfaced.

2. As soon as the backfilling of any excavation is completed, the Contractor must at once begin the removal of all surplus dirt except that actually necessary to provide for the settlement of all filling unless otherwise provided in the Special Provisions. He shall also remove all pipe and other material placed or left on the street by him except material needed for the replacement of the paving. The street shall be opened up and made passable for traffic and the City of Lake Charles shall be notified in writing to that effect at once. Following the above work, the repairing and complete restoration of the street surface, bridges, crossing all places affected by the work shall be done as promptly as possible.

3.05 PIPE INSTALLATION

A. General

1. All piping and fittings shall be installed true to alignment and rigidly supported. Anchorage shall be provided where required. Any damage to linings shall be repaired to the satisfaction of the Engineer before the pipe is installed. Each length of pipe shall be cleaned out before installation.

2. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600.

B. Jointing

1. Flanged joints shall be made using gaskets, bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same ANSI Standard as the flanges.

2. Bolts in flanged joints or mechanical joints shall be tightened alternately and evenly.

C. All pipe and appurtenances connected to equipment or structures shall be supported in such a manner as to prevent any strain being imposed. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, submit a certification stating that such requirements have been complied with.

D. Sleeves of proper size shall be installed for all pipes passing through floors or walls. Sleeves shall be installed as shown on the Drawings. Where indicated on the Drawings or required for liquid or gas-tightness, the pipe shall be sealed with a mechanical seal similar to Link-Seal as manufactured by Thunderline Corporation or equal.

E. Sleeves and wall pipes shall have thrust collars located at the mid-depth of wall.

F. Concrete inserts for hangers and supports shall be furnished and installed as recommended by the manufacturer as shown on the Drawings or as specified herein. The inserts shall be set in accordance with the requirements of the piping layout and their locations verified from approved piping layout drawings and the structural drawings.

3.06 PUMP AND EQUIPMENT INSTALLATION

A. Installation shall be in strict accordance with the manufacturer's instructions and recommendations in the locations shown on the Drawings. Anchor bolts shall be set in accordance with the manufacturer's recommendations and setting plans.

B. Qualified supervisory services, including manufacturers' engineering representatives, shall be provided for a minimum of 2 man-days to insure that the work is done in a manner fully approved by the respective equipment manufacturer. The pump manufacturer's representatives shall specifically supervise the installation and alignment of the pump with the driver, the grouting, and the alignment of the connection piping and the installation of the field-installed mechanical seal. If there are difficulties in the start-up or operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner. Services of the manufacturer's representatives and training shall be provided when the first pump is started, with follow-up visits upon start-up of each subsequent pump.

C. Connection of piping to pumps shall be done in presence of the Engineer. All piping connections to the pump shall be done without bending and/or twisting the piping to mate with the pump flange connections.

D. A certificate from each equipment manufacturer shall be submitted stating that the installation of his/her equipment is satisfactory, that the equipment is ready for operation and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.07 FIELD TESTS AND START-UP

A. A representative of the pump manufacturer is required to be present when pumps are first put in operation, in order to verify that the pumps operate property within specified operating limits and to provide the Owner, and when applicable, the City of Lake Charles, Wastewater Division, a letter stating such.

B. In the presence of the Engineer, such tests as necessary to indicate that the pumps, motors, and variable speed drives generally conform to the efficiencies and operating conditions specified shall be performed. A ten-day operating period of the pumps will be required before acceptance. If a pump performance does not meet the Specifications, corrective measures shall be taken or the pump shall be removed and replaced with a pump which satisfies the conditions specified. All test procedures shall be in accordance with Hydraulic Institute Standards certified results of tests shall be submitted.

C. After installation, all valves and appurtenances shall be tested at least 1 hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

END OF SECTION

SECTION 9

SANITARY SEWER LIFT STATIONS – ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE

A. The work covered by this specification consists of furnishing all labor, supervision, materials, equipment, tools, and supplies necessary for performing the electrical work required by this project, including, but not limited to, electrical power, controls, and grounding for the new lift station pumps.

B. It is the intent of the specifications that the Contractor furnish and install all electrical facilities necessary for the complete and operable systems for the project, whether described in detail or not, except for those items specifically stated as presently existing or furnished and/or installed by Owners or by others.

1.02 REFERENCES

A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. Underwriters Laboratories, Inc. (UL)

2. National Electrical Manufacturer's Association (NEMA)

3. American National Standards Association (ANSI)

4. Insulated Cable Engineers Association (ICEA)

B. The same manufacturer shall supply all material and equipment of the same class, unless specified to the contrary.

C. All products shall bear UL labels where standards have been set for listing.

1.03 SUBMITTALS

A. Submit drawings on all equipment for the Engineer’s approval. Include schematic diagrams, layout drawings, and component list, as well as current, voltage and short circuit ratings.

1.04 ACCEPTANCE

A. For acceptance of the lift station electrical components by the City of Lake Charles, the lift station shall meet the requirements stated in Section 8 - Sanitary Sewer Lift Station.

1.05 GUARANTEE

A. The Contractor shall guarantee all equipment and wiring furnished by him free from inherent mechanical and electrical defects for a period of one year from date of final acceptance.

B. Any replacement of parts, or adjustments, including labor, made necessary by inherent mechanical or electrical defects, shall be rendered without cost to the Owner within the guarantee period.

PART 2 PRODUCTS

2.01 3 PHASE DUPLEX AND TRIPLEX PUMP CONTROL PANELS WITH ACROSS THE LINE MOTOR STARTERS

A. The control panels shall be supplied by the manufacturer of the pumps. This is necessary to insure system compatibility and that warranty requirements are met. This contractor shall verify that these panels are included with the system indicated; otherwise, he shall be responsible for furnishing them and he shall bear all problems associated with incompatibility and warranty claim. Unless more stringent requirements are required in other sections or articles of these specifications, all control panels shall be manufactured by an Underwriters Laboratory (UL) Certified 508A panel manufacturer. Provide UL Certification number with submittals. Control panels shall be custom designed and manufactured using industrial rated individual components with high power surge capability. Commercial panels using printed circuit board technology for major components is not acceptable. Control panels shall be in accordance with the City's standard control panels as described below.

B. Duplex and Triplex panels shall contain the following equipment at a minimum:

1. Nema 4x Fiberglass enclosure (Owners standard) – Hoffman enclosure equipped with the Control Assembly Mitigation/Maintenance Option (CAM0). No equipment shall be mounted on the outer door.
2. Main distribution block for cable quantities and sizes shown on drawings
3. Thermo-magnetic circuit breakers (Square D – City standard) for each motor
4. NEMA rated across the line motor starters (Square D 8536 – City standard) with adjustable overloads. Individual heater packs are not acceptable.
5. 22mm HOA switches and LED run indicator lights for pumps
6. TVSS, UL 1449 listed (Square D type SDSA – City standard)
7. Phase monitor
8. 480-120v control power transformer with 3 fuses (for 480 volt panels)
9. Auxiliary circuit breakers to feed loads as indicated on the drawings
10. Adjustable resistance detector seal fail relays for submersible type pumps
11. Auxiliary dry contacts as required. See SCADA requirements.
12. Milltronics Hydroranger 200 ultrasonic level detector with sensor to fit in sensor pipe (City standard). Unit to be programmed to alternate pumps. Mount on inner door.
13. Stagger pumps on with minimum 3 seconds separation
14. Control panel door alarm switch

15. Class 1 Division 1 optical float switches rated at 15 million operations for transducer backup.
16. Adjustable time delay relay to allow the high level float to start and run pumps as described below for a set period of time, then stop the pumps. Cycle shall repeat when the level again rises to the high level float. This shall be arranged to be operator selectable in lieu of depending on the emergency off float to stop the pumps during emergency operating conditions. Pumps shall auto-reset after the level returns to normal.
17. Thermal switches in motor shall stop the pump and allow restart after automatically resetting.
18. Seal fail in motor shall indicate only and not stop the pump.

C. Duplex operation – Pumps shall operate in standard lead, lag operation. All pumps running shall pump to the stop level. In the event of a transducer failure, and at high level, both pumps shall start and pump to the stop level.

D. Triplex operation – Pumps shall operate in standard lead, lag 1, lag 2, operation. All pumps running shall pump to the stop level. In the event of a transducer failure, and at high level, 2 or 3 pumps (selectable) shall start and pump to the stop level.

E. Panels shall enclose and be wired for all motor branch components, circuit breakers, switches, pilot lights, relays, and other AC and DC control components as shown on diagrams and as required to perform functions as described in this and other sections of the specifications. Terminal strips shall be provided for connection of all external wiring. Terminal strips shall be heavy-duty types with barriers between points. Nameplates shall have white letters on black laminated phenolic plastic background glued to enclosure. Each enclosure shall be protected with Hoffman or equal corrosion inhibitors.

F. Control equipment shall be 22mm Square D, or approved equal as follows:

1. Push Buttons – Flush Button, Momentary Contact
2. Selector Switches – Standard Operator, Maintained Contact
3. Toggle Switches – Maintained Contact
4. Pilot Lights – LED

G. Total project spare parts shall be furnished as follows:

1. Four (4) of each size control and power fuses
2. Six (6) of each size indication lamps
3. One (1) of each size control transformer

H. Deliver spare parts to Owner, have Owner sign for them and supply copy of document to the Engineer.

2.02 SCADA SYSTEM

A. SCADA system shall be the City's standard by Louisiana Radio.

B. The monitor and control panel shall collect and forward equipment status to the central control room via radio, modem to be included. The panel shall contain, as a minimum, 8 digital inputs that may be field converted to outputs, 8 analog inputs capable of powering and accepting 4-20 mA signals, main circuit fuses, lightning arresting device, surge protection for protecting the full system from transient voltage surges caused by switching and utility regulation. The system shall provide a separate power supply for analog and control loops. An un-interruptible power supply capable of supporting the system for 24 hours shall be provided.

C. External wiring brought into the control panel shall be terminated on permanent, clearly marked contact blocks. All internal wiring shall have wire markers for identification. All equipment shall be housed in a lockable, gasketed, NEMA 4X Fiberglass weatherproof, and dustproof enclosure with continuous hinge. Penetrations to the enclosure shall be equipped with Myers Scru-Tite hubs to maintain the weatherproof integrity.

D. Signals to be monitored:

1. Power failure
2. High water alarm
3. Door switches for radio and pump panel
4. Pump amperage
5. Wet well level
6. Pump floor water alarm (2)
7. Operating on back-up floats

E. The monitoring system is to be complete with a Broad Directional Antenna. Mount antenna as directed by SCADA vendor. Antenna MUST BE MOUNTED AWAY FROM VENT PIPE. Contractor shall furnish the services of a Service Technician to assist in placing the system in operation. City Wastewater Electricians can provide information to contractor if further information is needed. Contact 337-491-8607, Wastewater Electrical Department for the City of Lake Charles.

F. The complete monitoring and control system is to be guaranteed by the General Contractor, materials and workmanship, for the required legal period or a minimum of one year; said guarantee shall be furnished to owner in writing.

2.03 ELECTRICAL SERVICE EQUIPMENT

A. Meter isolation disconnect switches up to 400 amps shall be as follows:

1. Amps – as shown on drawings
2. Voltage – as shown on drawings
3. Poles – 3
4. Type -Heavy duty, HP rated for all installed pumps operating simultaneously per the NEC
5. Short circuit rating – as shown on drawings
6. Enclosure - NEMA 3R painted steel

B. Main circuit breakers up to 400 amps shall be as follows:

1. Amps – as shown on drawings
2. Voltage – as shown on drawings
3. Poles – 3
4. Interrupting rating – as shown on drawings
5. Enclosure – NEMA 3R painted steel
6. Service entrance rated

C. Manual transfer switches up to 400 amps shall be as follows:

1. Amps – as shown on drawings
2. Voltage – as shown on drawings
3. Poles – 3PDT
4. Type - Heavy duty, HP rated for all installed pumps operating simultaneously per the NEC
5. Short circuit rating – as shown on drawings
6. Enclosure - NEMA 3R painted steel
7. Install 2” Myers hub in bottom of switch to pass portable generator cables. Install a plug in the hub to keep out insects

D. Conduit shall be as follows:

1. Above ground – Rigid schedule 40 aluminum
2. Below ground – Schedule 40 PVC
3. Below ground conduit that enters wet wells – PVC coated inside and out rigid aluminum
4. Utility underground service conduit – as required by Power Company

E. Wire and Cable shall be as follows:

1. All conductors shall be copper, shall conform to applicable ASTM Specifications as to conductivity, and shall be free from kinks and defects when installed.

2. All conductors shall be insulated unless specifically stated otherwise. Insulation shall be 600 volt 75 degree C THW, THWN, or XHHW for Wet and Dry locations.

3. All conductors and cables shall be specifically approved for use intended.

F. Junction Boxes:

1. Contractor shall furnish and install junction boxes as required in the raceway system for proper installation of the conductors and as shown on the drawings.

2. All boxes shall be sized in accordance with National Electrical code requirements.

3. A hinged door NEMA 4X stainless steel junction box shall be installed to receive the pump cables and other cable from the wet well.

4. Seal-off fittings shall be installed between the junction box and the control panel.

PART 3 EXECUTION

3.01 CUTTING, PATCHING AND FURRING

A. All cutting, patching and furring will be done by the General Contractor. However, the Subcontractor shall be responsible for timely and proper locations of openings to be left and shall advise the General Contractor of the same. If the Subcontractor fails to comply with the procedures and finds it necessary to cut openings in a finished portion of the structure, he will do so at his own expense, and all openings so cut must be left in a complete, finished manner.

3.02 EXCAVATING AND BACKFILLING

A. Excavation and backfilling required for the installation of electrical conduits shall be performed by the electrical contractor. He shall be responsible for the timely placement of conduit beneath concrete pavement. Placement of conduit beneath previously poured concrete pavement shall be done by the "jacked," "pushed," or "bored" methods.

3.03 INSTALLATION AND STORAGE

A. The Contractor shall store and install all equipment per the manufacturer's instructions and the Contract drawings.

B. After panel is installed, the conduits from the panel to the wet well shall be immediately sealed to prevent moisture and gasses from entering the panel. Permanent seals shall be by seal-off fittings in accordance with NEC Article 501 and NFPA Standard 820 for hazardous atmospheres.

3.04 EQUIPMENT IDENTIFICATION

A. All circuit breakers, starters and transformers shall be identified by an engraved bakelite nameplate attached to the enclosure by brass screws. Engraved letters shall be ¼" high.

3.05 METHODS OF WIRING

A. All circuits shall be run in conduit unless specifically stated otherwise. Cables not in conduit and subjected to tension shall be properly supported by the use of Kellems, or equal cable grips.

B. Contractor shall furnish and install all conduit clamps, LI-bolts, supports, and miscellaneous hardware required for proper installation and support of the electrical equipment.

C. Feeder conductors shall be continuous from point of origin to point of termination without splices.

D. Wiring shall be identified at all terminal points with Brady wire markers or other approved permanent type markers.

E. Where conduit enters sheet metal enclosures, Myers Hubs are required.

F. No splices or taps will be permitted in power or control circuits except at terminals on control devices, and on terminal boards in junction boxes or equipment, or as indicated on the drawings.

G. Power and control circuit terminations at equipment, devices, and terminal boards shall be made with spade type crimp connections.

3.06 GROUNDING

A. All electrical equipment and other facilities and devices shall be grounded as required by the National Electrical Code, as shown on the drawings and as further specified herein.

B. This conduit system is not considered a suitable ground path; for this reason, a ground wire network shall be used.

C. Ground rods shall be ¾" x 10' long "Copperweld" ground rods.

D. Equipment grounding conductors shall be sized per Table 250-95 NEC.

E. Grounding bushings shall be of the insulated type.

F. Bonding jumpers shall be used around concentric or eccentric knockouts on service equipment.

3.07 MAIN SERVICE & METERING

A. It shall be the responsibility of the Contractor to supply power to the site of the lift station. In the event power to the station is underground and no service pole available or desired by Owner, provisions shall be made on the control panel bracket to support the required electrical equipment.

B. The Entergy meter and C.T. enclosure, together with the main and disconnect switch or breaker, shall be mounted on a meter pole near the Entergy power pole, as shown on the drawings.

C. Contractor shall furnish and install all necessary brackets, supports and fasteners.

D. Contractor shall provide the service conduit and conductors as called for on the drawing(s).

E. The installation shall be in accordance with Entergy requirements including any requirements for soft starting motor starters at particular installations and payments to Entergy for their line modifications, extensions and other expenses that they may require.

3.08 TESTING

A. Before connection of any apparatus, contractor shall test all insulated wires, cables and buses to assure that the system is free of short circuits and undesirable grounds and is ready for operation. Contractor shall provide all necessary testing equipment for making tests. Cost of the tests shall be borne by the Contractor. Contractor shall notify Owner in advance of tests. All cables failing tests shall be replaced.

B. Motors shall be mechanically and electrically checked and tested before starting. Motors shall be meggered. Size of overload relays and circuit breakers for proper motor and feeder protection shall be checked. After each motor is started, the following is to be checked and recorded:

1. Line current
2. Current balance an three phases

C. Ampere readings for each phase of each motor at "No Load" and "Full Load" operating conditions shall be recorded and a copy of the data turned over to the owner.

D. Standard factory testing shall be performed on the equipment provided in this section.

END OF SECTION

SECTION 10

SANITARY SEWER LIFT STATIONS – FENCES AND GATES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work covered by this specification consists furnishing materials and constructing new chain link fences and gates in accordance with the details included herein and as shown on the plans. The class of fence to be erected six foot (6') chain link fencing, provided with privacy slats, as indicated on the plans for the sewer lift station.

B. Provide a 10 foot wide, 2 leaf, padlockable gate that accesses the lift stations' submersible pumps from the driveway or street side.

1.02 REFERENCES STANDARDS

A. All materials and equipment shall conform to the requirements of the Contract Documents. They shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards:

1. American Society for Testing and Materials (ASTM)

2. Federal Specifications

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.03 ACCEPTANCE

A. For acceptance of the lift station fencing by the City of Lake Charles the fencing shall meet or exceed the requirements stated in herein.

PART 2 PRODUCTS

2.01 GENERAL

A. The fence shall be the product of a manufacturer who has demonstrated by actual installations of a similar nature that its product is of the type required. The Contractor shall include all supplemental parts necessary or required for a complete and satisfactory installation within the true meaning and intent of the drawings. All runs of the fence shall present the same general appearance and the product of one manufacturer only will be accepted, except for items which do not influence the appearance of the completed fence. No used, re-rolled, or open-seam steel shall be permitted in posts, gate frames, rails, or braces.

2.02 FABRIC

A. The chain link fabric shall conform to Federal Specification RR F 191/1D. The chain link fabric shall be Type I. The fabric shall be 11 gauge core wire, woven in a 2-inch mesh and be hot dipped galvanized after weaving, and be in accordance with ASTM A392. The height of fabric shall be 72-inches. Top and bottom selvages shall have a twisted barbed finish, barbs to be formed by cutting wire on a bias. Fabric shall be fastened to intermediate posts with No. 6 aluminum fabric wire spaced approximately 15-inches apart and to top rail with 9 gauge wires spaced approximately 18-inches apart. The fabric shall be securely fastened to all terminal and gate posts with 1/4-in by 3/4-in stretcher bars with No. 11 gauge pressed steel bands spaced approximately 12-inches apart. Stretcher bars for security fencing shall be 3/8-in by 3/16-in. All bands, wires and tension bars shall conform to Federal Specification RR F 191/4D.

2.03 POSTS, RAILS, AND BRACES

A. Posts, rails and braces shall conform to Federal Specification RR F 191/3D and be fabricated of Class I (round steel sections), Grade A (hot dipped galvanized), seamless steel pipe, in accordance with ASTM A53 (Schedule 40), and be of the following sizes:

1. Corner and Terminal Posts: 5P4 (2.875-inch o.d.)

2. Line Posts: SP3 (2.375-inch o.d.)

3. Rails and Braces: SP1 (1.66-inch o.d.)

4. Spacing of posts shall not exceed 10-feet.

2.04 ACCESSORIES

A. Accessories shall conform to Federal Specification RR F 191/4D, shall be hot dipped galvanized in accordance with ASTM A123 or A153. In addition to wire ties and clips, brace bands, tension bands and bars, tension wire and truss rods (all of which are described herein), accessories shall include the following:

1. Caps for all exposed ends of posts.

2. Top rail and brace ends or other suitable means of connection.

3. Top rail sleeves to allow for expansion and contraction of the top rail.

4. Bottom tension wire shall be 7 gauge galvanized steel wire. Fabric shall be attached to tension wire with 11 gauge galvanized steel hog rings spaced no more than 24-inches on center.

2.05 GATES

A. Gate and hardware shall conform to Federal Specification RR F 191/2D. Gates shall be

constructed of Class I, Grade A seamless steel pipe, size SP1, plus additional intermediate members when required and meeting the requirements of RR F 191/3D. Structural members of gates, which are in contact, shall be fully welded by a method that will procure a continuous weld on all sides and faces of joints at exposed edges. Surplus welding material shall be removed and all welding shall be done prior to galvanizing. Gate fabric shall be of the type, mesh, gauge, color and salvage as that specified above for fabric. Install fabric with stretcher bars at vertical edges and tie wires at top and bottom edges. Attach stretcher bars to gate frames at not more than 12-inches o.c.

2.06 GATE HARDWARE

A. Hinges, latches, stops and keepers shall be hot dipped galvanized in accordance with ASTM A153.

B. Hinges shall be pressed steel or malleable iron, sized to suit gate, non- lift off type and offset to permit 180 degree gate opening. Provide one pair of hinges for each leaf (up to 12-ft high).

C. Latch shall be forked type to permit operation from either side of gate. Provide padlock eye as integral part of latch.

D. Keeper shall automatically engage the gate leaf and hold it in the open position until manually released.

E. Stop, consisting of drop rod, shall be provided to hold the inactive leaf. Steel sleeves shall be provided to engage the drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.

2.07 PRIVACY SLATS

A. Plastic fencing slats manufactured from 97 percent recycled plastic containing 97 percent post-consumer recycled plastic.

B. Slats shall be green in color and shall be 3.5-inches shorter than the overall fence height.

C. Slats shall be bottom lock design.

2.08 CONCRETE

A. Concrete shall be ASTM C 94; type II Portland Cement; 2500 psi at 28 days; 3-inch (75 mm) slump; 3/4-inch (20 mm) maximum size aggregate.

PART 3 EXECUTION

3.01 GENERAL

A. The fence shall be constructed in accordance with the details on the plans and as specified herein using new materials, and all work shall be performed in a workmanlike manner. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall be required to stake down the chain link fence at

several points between posts.

3.02 INSTALLING POSTS

A. All posts shall be spaced not more than 10 feet apart. Terminal (end, corner, pull and brace) and gate posts shall be set in 36-inch deep by 12-inch diameter concrete bases. All line posts shall be set in 30- inch deep by 9-inch diameter concrete bases. The top of the concrete bases shall be slightly above the ground; trowel finished, and sloped to drain away from the posts. All post settings shall be done carefully so that all posts shall be vertical and in true alignment and rigidly secured in position.

B. Brace all terminal posts horizontally with sections used for top rail. The top rail shall extend through all line posts to form a continuous brace from end to end of each stretch of fence, be securely fastened at the end of each run, and have joints made with expansion sleeve couplings not less than 6 inches long.

C. If the ground is not level, the upgrade gate post shall be set first to get the proper height for the downgrade gate post. The concrete bases for end, corner, pull, brace, and gate posts shall be placed first and allowed to cure for 7 days. Stretcher bar bands and truss bands as specified on the plans shall be spread and slipped on end, corner, pull, brace, and gate posts as the next operation. Post tops are then inserted on all other posts.

D. Fence posts mounted to concrete deck shall be installed with Stainless Steel anchors, non-shrink grout and a galvanized plate.

3.03 INSTALLING TOP RAILS

A. To begin the installation, a length of top rail shall be run through the first couple of post tops; a rail clamp shall be assembled on the end, corner, or gate post, as the case may be. The end of the rail already placed shall be butted into the clamp and fastened. The top rail shall be installed along the run of the fence and the various sections joined with sleeve couplings. The rail shall be clamped in the end, corner, or gate post at the end of the run of the installation of top rail.

3.04 INSTALLING BRACES

A. All horizontal braces shall be attached together with truss rods at all terminal (end, corner, and pull) and gate posts to the brace posts as shown on the plans.

3.05 INSTALLING FABRIC

A. The fabric shall be unrolled on the outside of the fence line with the bottom edge of the fabric against the posts. The various rolls shall be spliced by bringing the ends close together and weaving in a picket in such a way that it will engage both of the roll ends and catch with each twist each separate mesh on the end pickets of both rolls of fabric. The fabric shall be raised and tied loosely to the top rail with a temporary tie wire at intervals of about 20 feet.

B. At end, corner, or gate posts, the stretcher bar shall be slipped through the end picket of the fabric

and the stretcher bar bands at the same time. Then the bolts in the stretcher bar bands shall be tightened. Additional rolls of fabric shall be spliced and placed as the erection progresses along the fence.

C. The fabric shall be attached to the line posts with No. 6 gauge galvanized wire clips securely clinched to the back of the line posts. The fastenings shall be spaced not more than 14-inch on centers for line posts. The topmost clip shall be placed on the line post as near the top of the fabric as possible and the lowest clip as near the bottom of the fabric as possible.

D. Standard chain link fence stretching equipment shall be provided for stretching the fabric before tying it to the rails and posts.

E. Privacy slats are to be installed at the completion of fabric installation and shall be woven into the fabric, per the manufacturer recommendations. Damaged or cracked slats shall be replaced at the Contractors expense.

3.06 INSTALLING GATES

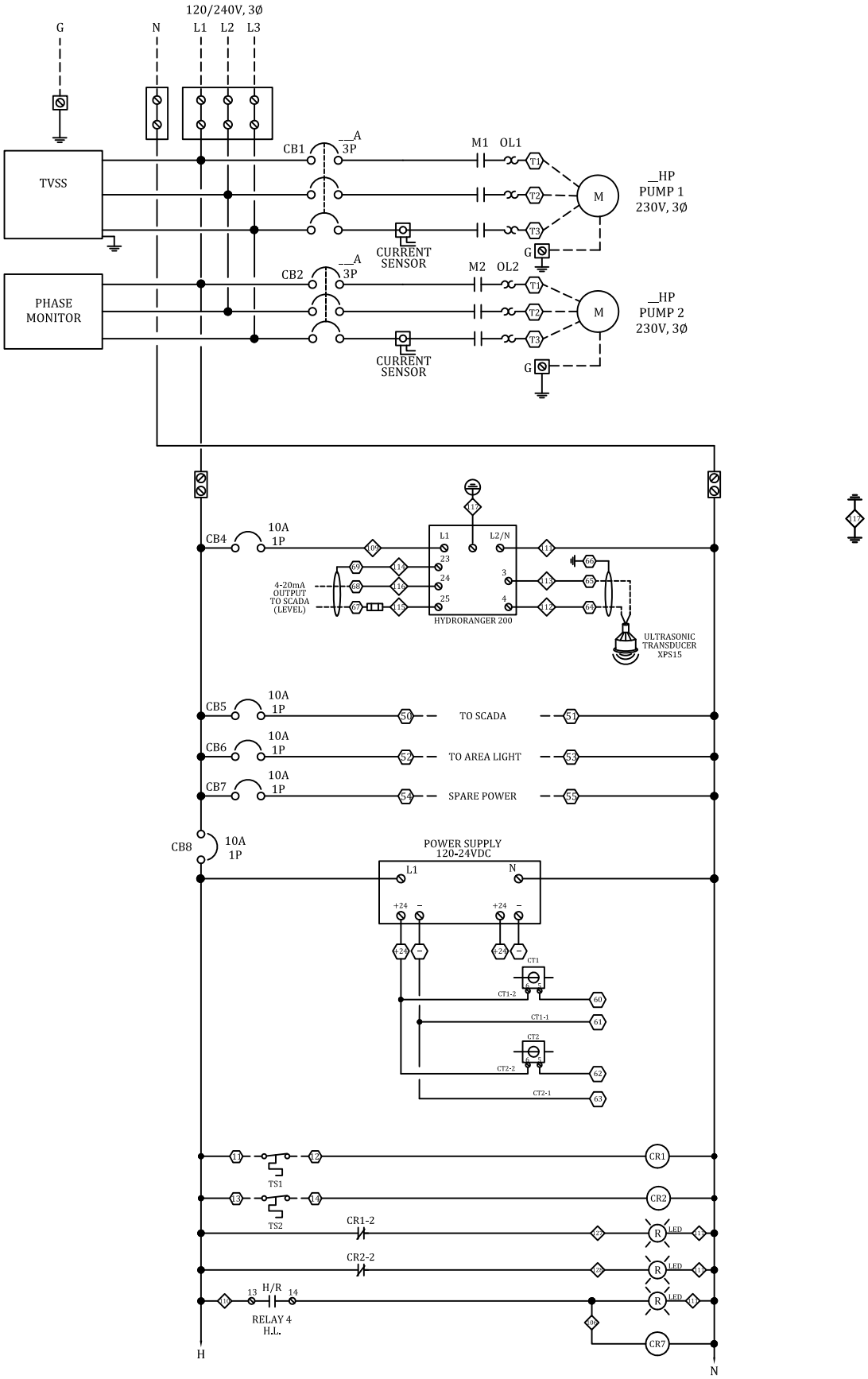
A. The gates shall be hung on gate fittings and installed in the following manner. The lower hinge (ball and socket type) shall be placed on top of the concrete footing in which the gate post is set; the concrete in the footing shall extend up to the bottom of the lower hinge. The sockets for the cane or foot bolts shall be set in concrete so that the plunger pin will fit perfectly in the socket when the gate is in a closed position. Gates shall be erected to swing away from the lift station, and shall be provided with gate stops as properly required. All hardware shall be thoroughly secured, properly adjusted, and left in perfect working order. Hinges and diagonal bracing in gates shall be adjusted so that the gates will be hand level.

3.07 CLEAN-UP

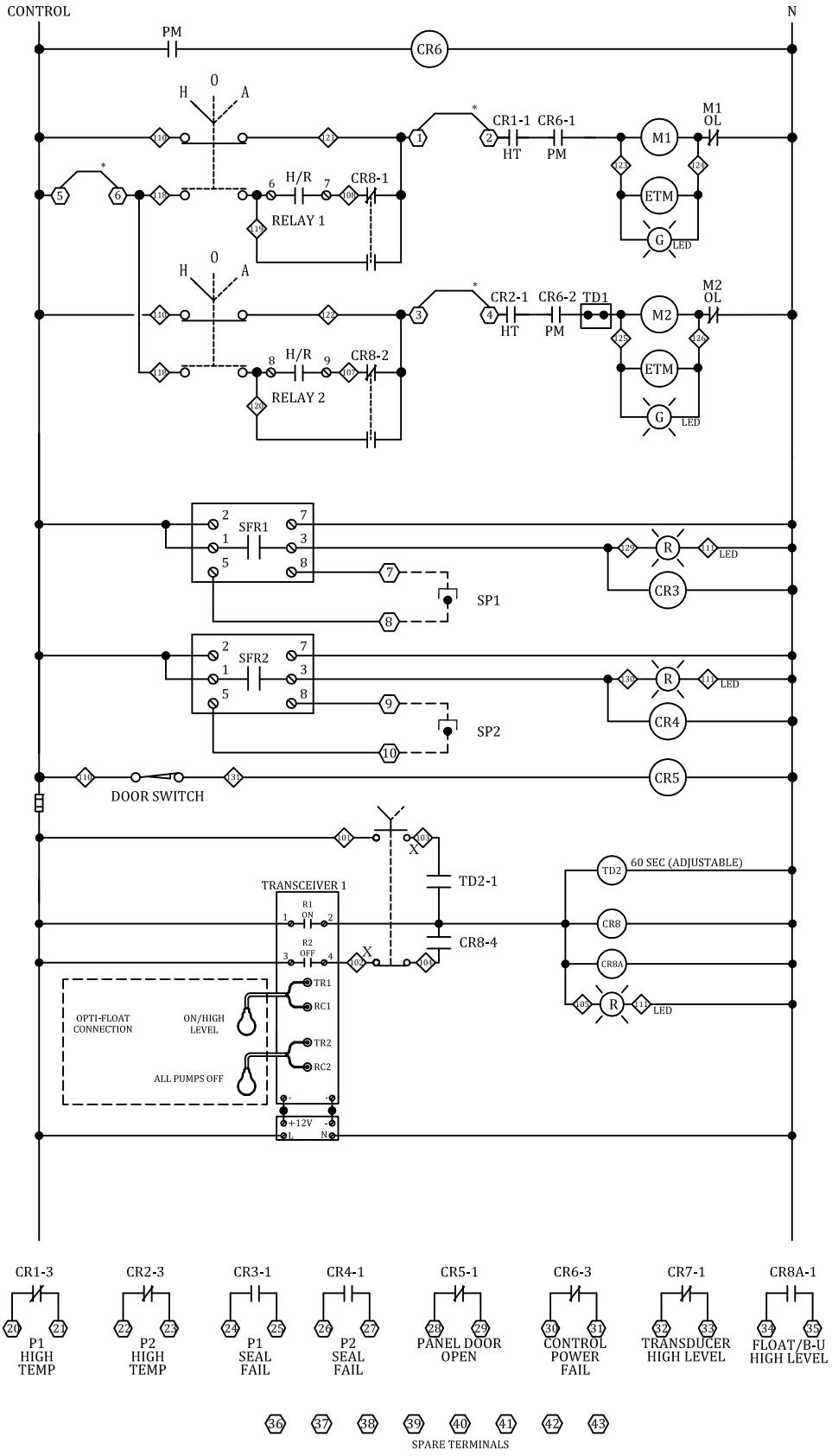
A. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction.

END OF SECTION

CITY OF LAKE CHARLES
STANDARD 120/240,3Ø
DUPLEX PUMP
CONTROL PANEL



	Drawing Title: POWER DIAGRAM
DATE 1/23/15	DUPLEX SHOWN, TRIPLEX SIMILAR
	Project Title: STANDARD 120/240V,3Ø DUPLEX PUMP CONTROL PANEL
SHEET 1 of 3	CITY OF LAKE CHARLES



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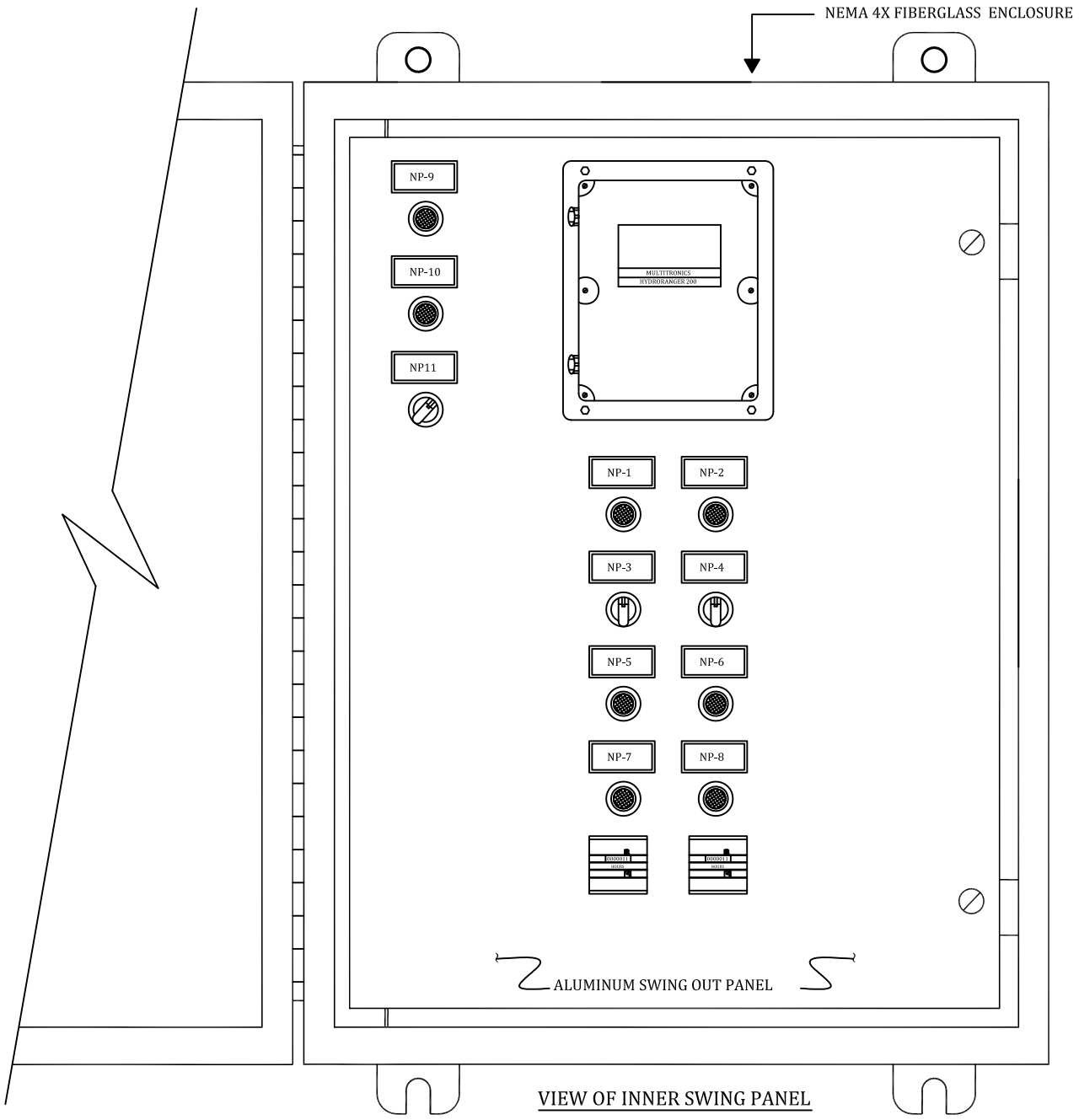
DATE 1/23/15	
	Project Title: STANDARD 120/240V,3ø DUPLEX PUMP CONTROL PANEL
SHEET 2 of 3	CITY OF LAKE CHARLES

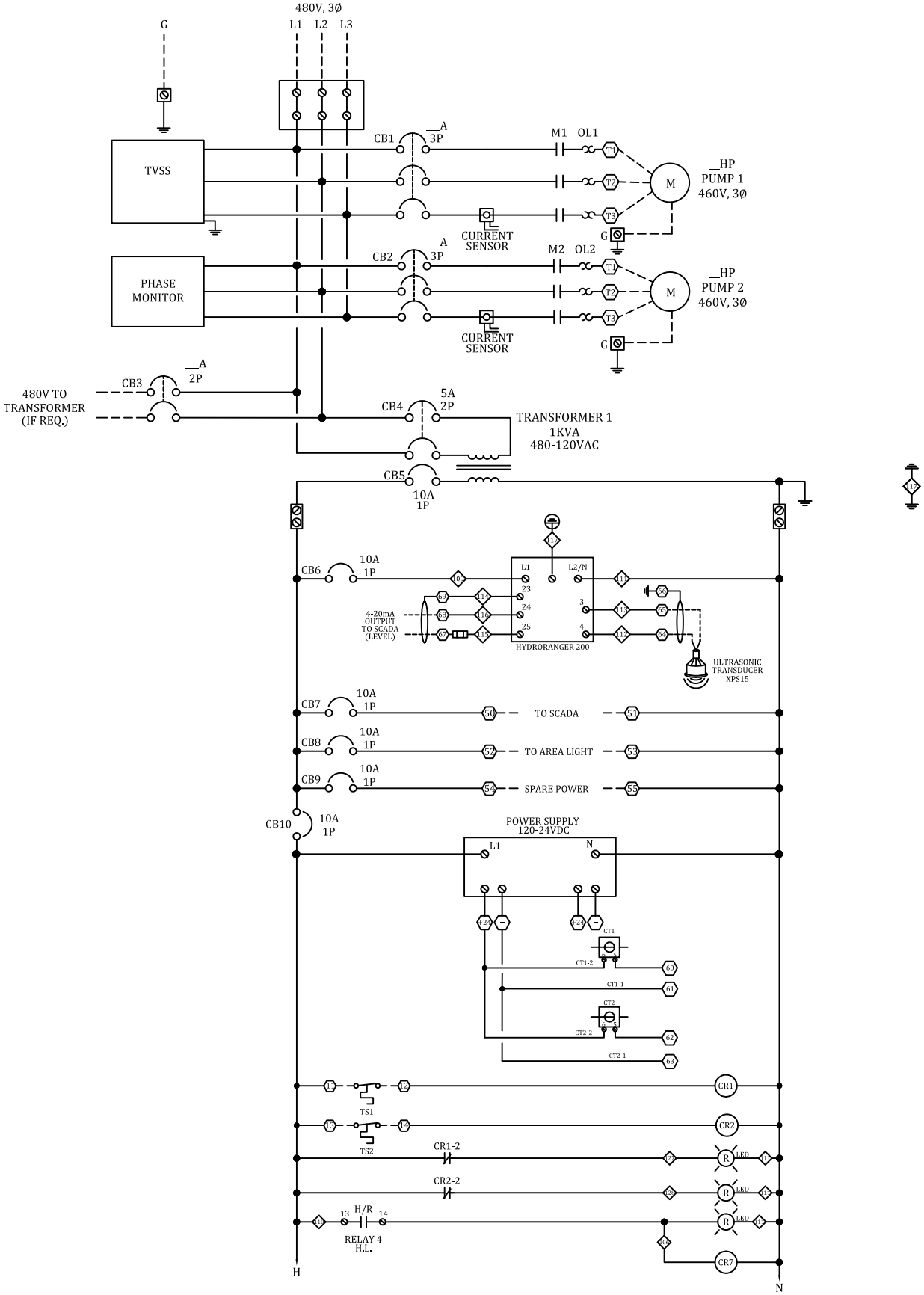


VIEW OF INNER SWING PANEL

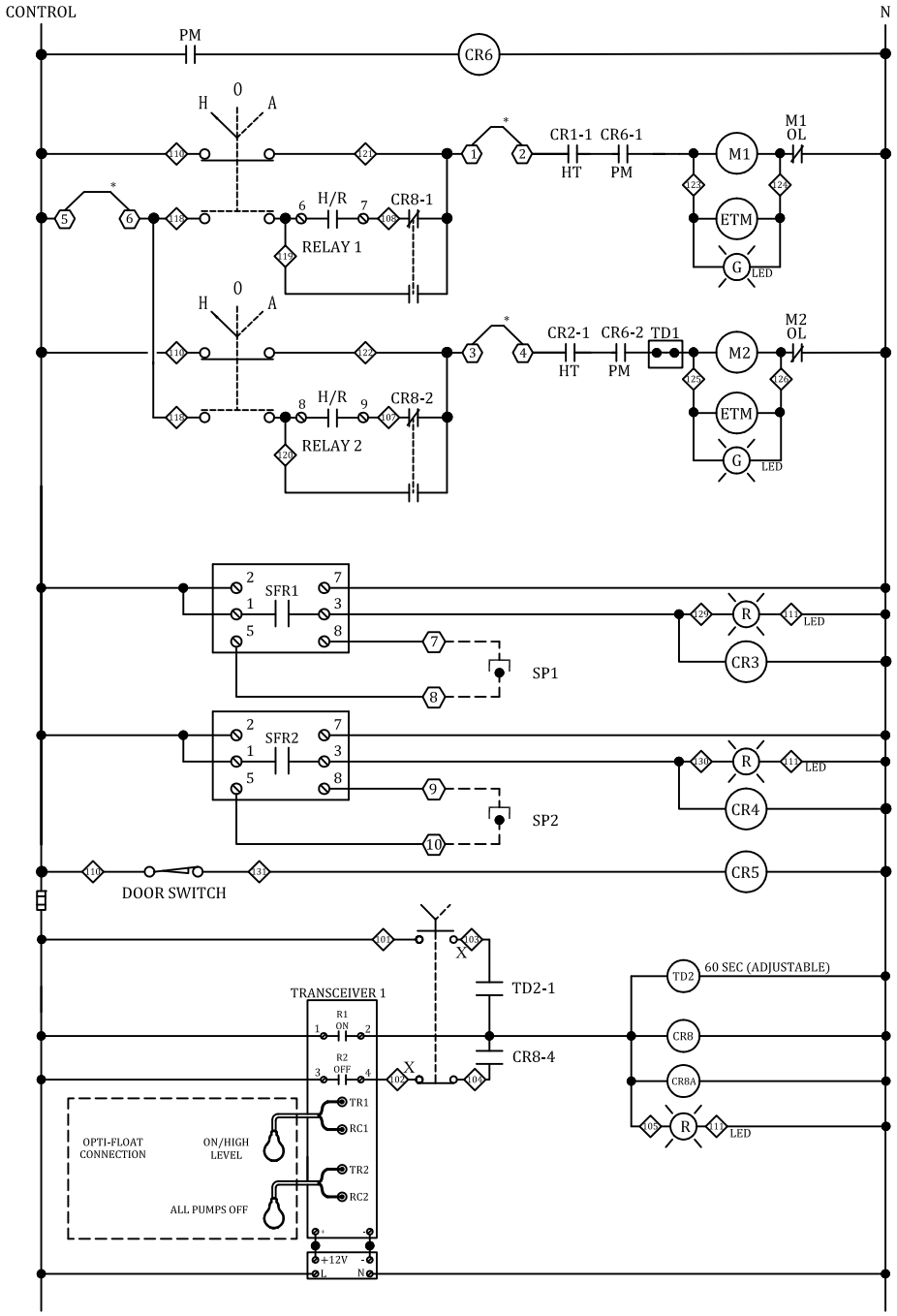
NOTE:
SEWER GASSES WILL DESTROY COMPONENTS IN PANEL.
PROPER SEALS MUST BE INSTALLED EXTERNAL TO THE
PANEL TO PREVENT ENTRY OF GASSES.

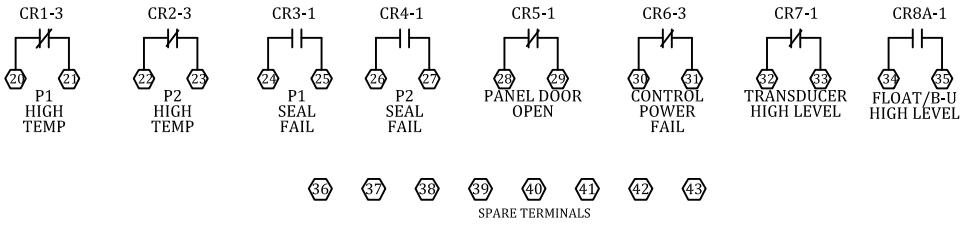
	Drawing Title: ENCLOSURE
DATE 1/23/15	
	Project Title: STANDARD 120/240V,3ø DUPLEX PUMP CONTROL PANEL
SHEET 3 of 3	CITY OF LAKE CHARLES

CITY OF LAKE CHARLES
STANDARD 480V/3Ø
DUPLEX PUMP
CONTROL PANEL

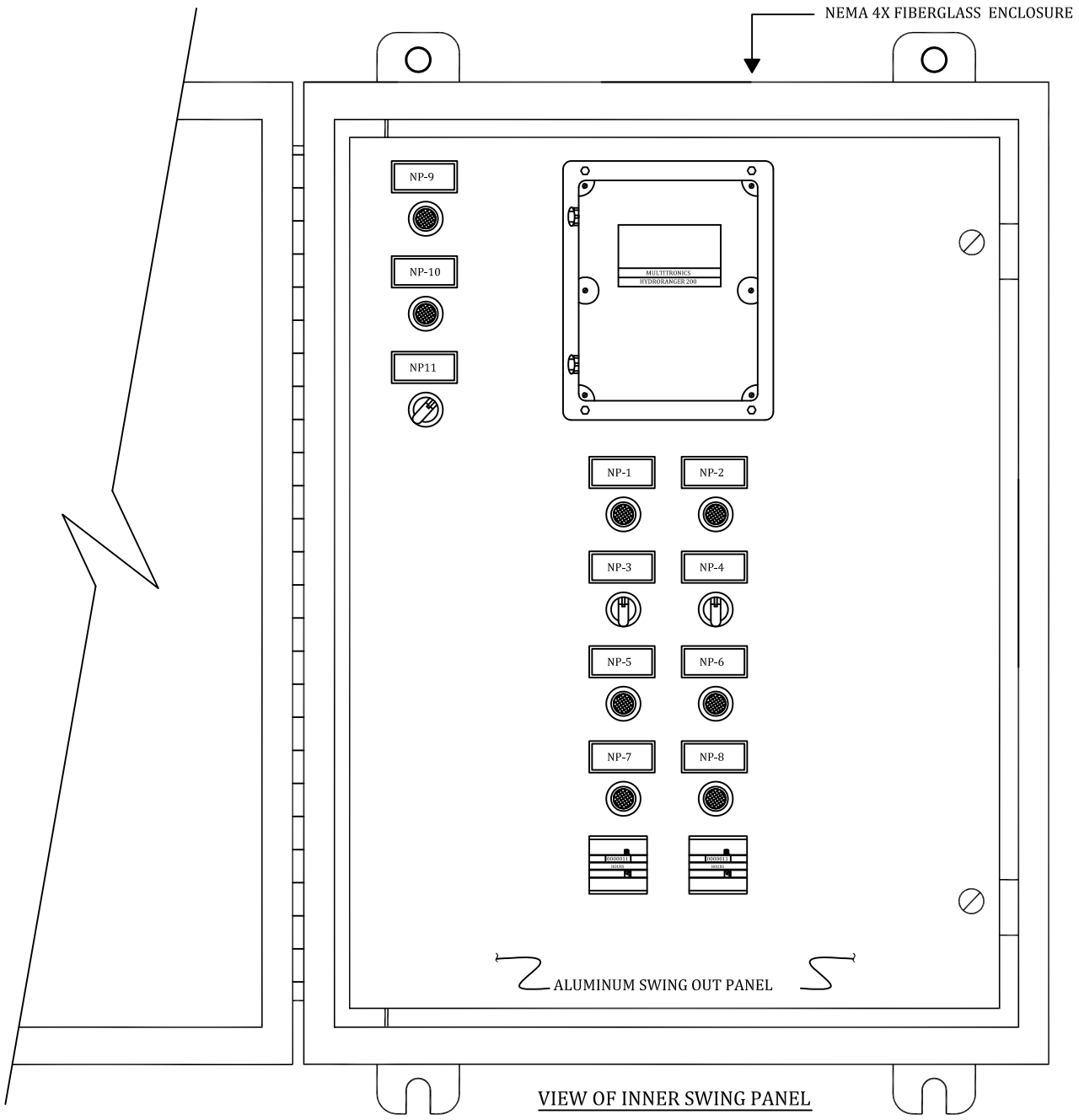


	Drawing Title POWER DIAGRAM
DATE 1/23/15	DUPLEX SHOWN, TRIPLEX SIMILAR
	Project Title STANDARD 480V/3Ø DUPLEX PUMP CONTROL PANEL
SHEET 1 of 3	CITY OF LAKE CHARLES





	Drawing Title: CONTROL DIAGRAM
DATE 1/23/15	
	Project Title: STANDARD 480V/3ø DUPLEX PUMP CONTROL PANEL
SHEET 2 of 3	CITY OF LAKE CHARLES



VIEW OF INNER SWING PANEL

NOTE:
SEWER GASSES WILL DESTROY COMPONENTS IN PANEL.
PROPER SEALS MUST BE INSTALLED EXTERNAL TO THE
PANEL TO PREVENT ENTRY OF GASSES.

	Drawing Title ENCLOSURE
DATE 1/23/15	Project Title STANDARD 480V/3ø DUPLEX PUMP CONTROL PANEL
SHEET 3 of 3	CITY OF LAKE CHARLES

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Pipe insulation installation shall not begin until all work has been tested and found to be tight.

PART 2 - MATERIALS

2.1 THERMAL INSULATION

A. After all work has been tested and found to be tight, insulate as follows:

B. Cover all domestic cold and hot water lines and hot water return lines above slab with 1" thick, high density fiberglass insulation with Universal Fire Retardant Jacket, Owens/Corning "25 ASJ/SSL", Knauf ASJ-SSL, or equal. All laps are to be sealed and stapled in place. Fittings are to be mitered segments of insulation held in place with white vapor barrier tape for concealed areas and Zeston 25/50 PVC, Knauf 25/50 rated PVC, pre-molded insulated fitting covers in exposed areas.

C. Domestic cold and hot water lines(2 -1/2" and above) shall be insulated with 1-1/2" thick fiberglass with jacket.

D. All water lines exposed in mechanical rooms shall be covered with 0.030 PVC jacket with solvent welded seams and joints.

E. All water lines on the outside of the building exposed to the weather shall be covered with 0.160 smooth aluminum jacket and elbows.

F. Domestic cold and hot water lines run below slab within building shall be insulated with 3/4" thick closed cell tube insulation. Apply two (2) coats of mastic on insulation.

G. All hosebibbs and valves on the outside of the building exposed to weather shall be covered with insulation and sealed with mastic.

H. Mastic shall be white vapor barrier type. All insulation shall be installed in strict accordance with manufacturer's recommendations.

I. All valves, strainers, etc. shall be covered and the covering shall extend all the way up to the equipment.

J. All pipe insulation where recommended by the manufacturer shall be banded with aluminum bands, three to a section, and with one band on each side of each fitting, valve, etc.

K. P-traps receiving HVAC condensate (exposed to weather or above ceilings) shall be insulated with 2-1/8" thick 3/4 # density fiberglass ductwrap insulation with aluminum foil vapor barrier. Insulation shall be sealed at all seams and joints.

L. Insulate p-trap, tailpiece and water supplies on handicapped lavatories with white, Truebro Model 102 Handi Lav-Guard, Pro-Wrap A.D.A. lavatory insulation kit, or approved equivalent insulating system to meet A.D.A. Requirements. Provide accessories for offset tailpiece as required.

M. Insulation through hangers and sleeves shall be continuous through pipe hangers and pipe sleeves. At hangers where the pipe is supported by insulation, provide a galvanized iron protection shield. Provide pipes 2-inch i.p.s. and larger in insulation inserts at points of hanger supports. The inserts shall be of calcium silicate, cellular glass, prestressed molded glass fiber of minimum 13-pound density, or other approval material of the same thickness as adjacent insulation and not less than 13-pound density. The inserts shall have sufficient compression strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Inserts shall be 180 degrees and not less than the length of the protection shield. Vapor barrier facing of the insert shall be the same as the facing on the adjacent insulation. Where copper clad hangers are used on domestic copper pipe, insulation may cover pipe and hanger. Provide 18 gauge metal saddles between all hangers and insulation.

END OF SECTION 22 07 00

SECTION 22 11 00 - WATER SUPPLY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide and install new domestic hot and cold water distribution system as indicated on drawings. Contractor shall pay all service and connection charges including tap and meter cost.

B. Contractor shall pay for any boring required for the project.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. All water supply piping shall be of materials hereinbefore specified. Contractor shall make provisions for expansion and contraction of hot water lines by means of expansion bends or loops as required.

B. All water lines shall be disinfected in accordance with local code authorities.

C. Water lines run underground shall have a minimum cover of 36" from top of pipe to finished grade and hot water lines and cold water lines running parallel shall be run a minimum of 18" apart. Water lines shall be run a minimum of 8' each side of sanitary sewer piping.

D. This Contractor shall make up a complete water supply system. Connect water lines to all fixtures and outlets requiring water and provide valved stubouts for continuation by other trades where so called for.

E. At each fixture or group of fixtures, furnish and install a 12" high air chamber of same size as the branch feed line except at fixtures with quick closing valves such as dishwashers, etc., in which case provide "Shocktrol", Wade, Zurn, Josam or equal and properly sized for each unit.

F. Contractor shall use "lead free" solder, pipe, and fittings for the installation of all piping. "Lead free" when used with respect to solder and flux shall refer to solder and flux containing not more than 0.2 per cent lead. When used with respect to pipes and fittings, "Lead Free" shall refer to pipes and fittings containing not more than 0.25 per cent lead. All installations of domestic water systems shall conform with ANSI/NSF Standards 61 and 372. Refer to 2013 Louisiana State Plumbing Code 303.F for requirements.

G. All water piping shall be disinfected in accordance with AWWA standards and local and state Plumbing Codes. All water piping where located below grade shall be placed a minimum of 36" below grade.

PART 3 - EXECUTION

3.1 TESTING

A. All domestic water lines shall be tested under 200 psig hydrostatic pressure for a minimum of five (5) hours unless elsewhere specified.

END OF SECTION 22 11 00

SECTION 22 13 00 - WASTE WATER DISPOSAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Connect to sanitary sewage system as indicated on plans. Contractor shall verify all elevations and inverts prior to beginning construction.

B. Contractor shall pay for service and connection charges to the existing municipal system.

C. All work shall be in strict conformity with all local codes. Piping shall be routed as shown on plans or in an acceptable manner to meet building conditions. Venting shall be as shown on plumbing riser diagrams.

D. Connections between traps and cast iron pipes are to be made with heavy brass ferrules.

E. Provide reducers, increasers, special flanges, and fittings where required between piping work and fixtures in order to connect and complete work and render it ready for use. Make any offsets required to avoid construction.

F. All lines 3" and smaller shall be sloped 1/4" per foot and all lines 4" shall be sloped 1/8" per foot. Piping shall be laid so slope is continuous.

G. All vents shall extend 10" above roof and terminate in an appropriate lead flashing collar. No vents shall penetrate roof within 48" of an exterior wall. Offset in ceiling as required. All back vents shall be taken off as near trap as possible.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vents - Provide flashing collar as detailed. Coordinate with roofing contractor to maintain roof warranty.

PART 3 - EXECUTION

3.1 TESTING

A. Test all plumbing sewer lines, vents, waste, etc. with a minimum of 10' water head, for 24 hours and in accordance with local code authority requirements. If the sanitary sewer test fails, the contractor shall remove test, repair defective pipe, joint or system and shall retest for 24 hours.

END OF SECTION 22 13 00

SECTION 22 42 00 - PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor and materials as hereinbefore specified, indicated or reasonably implied for the complete installation of the following systems:

1. Hot Water System
2. Sanitary Drainage System
3. Cold Water System

PART 2 - PRODUCTS

2.1 FLASHING

A. Flash around all pipes passing through roof in connection with this contract with sheet lead, not less than 4 # to the square foot, built 6" into the waterproofing, running 10" up the pipe and turned over into the pipe cavity. Flashing around roof drains shall be not less than 4 # lead extending at least 12" from the drain rim into membrane waterproofing. Fasten flashing to drain clamp device making watertight durable joint.

2.2 ELECTRIC HOT WATER HEATERS

A. Model Number - Furnish and install electric hot water heaters as scheduled and detailed on plans.

B. Warranty - The tank shall have a five (5) year warranty to protect the owner against defects in material and workmanship, discolored water or tank perforation due to erosion and corrosion.

C. Provide flue vents to comply with requirements of manufacturer's installation instructions.

D. Contractor shall pay for and obtain a State Fire Marshal inspection and permits for all water heaters 50 gallons and greater.

2.3

2.4 PLUMBING FIXTURES

A. Plumbing Contractor shall furnish and install all plumbing fixtures shown on accompanying Drawings. Refer to both Plumbing and Architectural, and provide all fixtures shown on either. Fixtures shall be complete with all necessary brass and accessories required for a complete installation, including traps, escutcheons, angle supplies, basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated in perfect condition.

B. All brass must be of the best quality. Lightweight goods will not be accepted.

C. All brass pipe shall be seamless brass tubing and nipples shall be extra heavy.

D. All fittings and trim shall be chromium plated heavy brass unless otherwise specified.

E. "P" traps on lavatories and sinks shall be cast brass with cleanouts.

F. All exposed piping shall be chromium plated.

G. Provide cut-off valves at each fixture in both hot and cold water piping.

H. Refer to Architectural Drawings for mounting height and exact location of all plumbing fixtures. Handicapped fixtures shall be installed to meet the latest A.D.A. requirements. Plumbing Contractor shall furnish and install all plumbing fixtures shown on accompanying drawings. Refer to both plumbing and architectural drawings and provide all fixtures shown on either. Fixtures shall be complete with all necessary brass and accessories required for a complete installation including traps, escutcheons, angle supplies, basin cocks, etc. All fixtures shall be new and must be delivered to the building properly crated in perfect condition.

I. All brass must be of the best quality, lightweight goods will not be accepted. All brass pipe shall be seamless brass tubing and nipples shall be extra heavy. All fittings and trim shall be cast brass with cleanouts. All exposed piping shall be chromium plated. Provide cut-off valves at each fixture in both hot and cold water piping.

J. For the purpose of establishing type and class of fixtures required, the following plate numbers have been taken from the Kohler catalog unless otherwise indicated. Fixtures as manufactured by Kohler, or American Standard of equivalent quality and manufacturer will be accepted.

K. Refer to plumbing fixtures. Plumbing fixture schedule on plans for plumbing fixtures.

2.5 SPECIALITY EQUIPMENT AND CONNECTIONS:

A. Plumbing Contractor shall be responsible for connecting to equipment at location indicated on Plans in accordance with manufacturer's requirements. Refer to Architectural Drawings for list of equipment. Plumbing Contractor shall provide necessary rough-in required for all equipment and shall completely connect all plumbing services for the equipment. It is the obligation of the Plumbing Contractor to obtain correct rough-in dimensions for all equipment.

B. All security fixtures shall be installed in strict accordance with the manufacturer’s installation instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

1. All plumbing fixtures shall be installed as per local code authorities.

2. All tests shall be in accordance with local code authorities.

3. All supply piping (hot and cold) to all sinks, lavatories, water closets, water coolers, etc. shall be installed so that no more than ½" of copper tubing is exposed at the supply/cutoff valves.

END OF SECTION 22 42 00

SECTION 23 00 10 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions, Division 0) and Division 1 as appropriate, apply to the Work specified in this Section.

B. Refer to Division 23, Mechanical, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding mechanical work.

1.2 SCOPE OF WORK

A. Project includes installing a new HVAC, plumbing and sprinkler systems for the new culinary building.

B. Furnish all labor and material necessary to provide and install the complete mechanical portion of this Contract, including plumbing, air conditioning, heating and ventilating systems as called for herein and on accompanying drawings. Parts of the mechanical division may be bid separately or in combination, at the Contractor's option; however, it shall be the responsibility of the General Contractor to assure himself that all items covered in the Mechanical Division have been included if he chooses to accept separate bids.

C. It is the intent of this specification that all Division 23 materials with temperatures below ambient conditions or conveying any fluid/gas at temperatures below 70 deg. F be insulated to completely eliminate the potential for condensation. Unless specified elsewhere in these specifications, for materials that do not require access, insulate with 2.33" thick 3/4# density fiberglass duct wrap insulation with foil face (seal all joints air and water tight). For materials requiring occasional access, use 2.33" thick closed cell rubberized insulation with re-sealable fabric joints (hook and loop type).

D. Contractor shall refer to the Architectural and Structural drawings and install equipment, piping, etc. to meet building and space requirements. No equipment shall be bid on or submitted for approval if it will not fit in the space provided.

E. It is the intention of these specifications that all mechanical systems shall be furnished complete with all necessary valves, controls, insulation, piping devices, equipment, etc. necessary to provide a satisfactory installation that is complete and in good working order. The HVAC system shall ensure that under all circumstances, the building shall be kept at temperatures and indoor space relative humidities that when compared to outside temperatures and relative humidities protect building finishes installed under this contract and/or existing floor, wall and ceiling finishes within the building from damage due to excessive temperature or humidity. HVAC system shall ensure that building remain under a slight positive pressure.

F. Contractor shall visit the site and acquaint himself thoroughly with all existing facilities and conditions which would affect his portion of the work. Failure to do so shall not relieve the Contractor from the responsibility of installing his work to meet the conditions.

G. This Contractor shall protect the entire system and all parts thereof from injury throughout the project and up to acceptance of the work. Failure to do so shall be sufficient cause for the Architect to reject any piece of equipment.

1.3 DEMOLITION

A. The contractor shall visit the site prior to bid to determine the extent of work required to complete the project.

B. Contractor shall coordinate demolition with owner. All equipment shall be salvaged for owner. Locate equipment as directed by owner. All equipment and materials not salvaged by the owner shall be removed from the site and discarded at the contractors expense.

C. Contractor shall coordinate all work with general contractor and phase work as required by project.

D. All equipment piping, etc. required to be removed to accommodate the modifications shall be removed.

E. Contractor shall maintain services to existing facilities which shall remain during and after construction is complete.

F. Contractor shall coordinate any shutdown of services with the owner. It is intended that the building will remain occupied during construction. Contractor shall schedule shut down of services with the owner in order to prevent disruption of building occupancy.

G. Contractor shall be responsible for draining down of existing systems to complete demolition. All work shall be scheduled with the owner. Contractor shall also be responsible for refilling system and removing all air in order to return the systems to proper operating conditions.

H. All shutdown of services shall be done during a time period approved by owner. The systems shall be required to be back up and running each morning unless otherwise approved by the owner.

1.4 GROUNDS AND CHASES

A. This Contractor shall see that all required chases, grounds, holes and accessories necessary for the installation of his work are properly built in as the work progresses; otherwise, he shall bear the cost of providing them.

1.5 CUTTING AND PATCHING

A. Initial cutting and patching shall be the responsibility of the General Contractor, with the Mechanical Contractor being responsible for laying out and marking any and all holes required for the reception of his work. No structural beams or joists shall be cut or thimbled without first receiving the approval of the Architect/Engineer. After initial surfacing has been done, any further cutting, patching and painting shall be done at this Contractor's expense.

1.6 FILL AND CHARGES FOR EQUIPMENT

A. Fill and charge with materials or chemicals all those devices or equipment as required to comply with the manufacturer's guarantee or as required for proper operation of the equipment.

1.7 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work , of all trades and sub-contractors bidding this project. It is the prime bidders responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation, that require provision of services by another sub-contractor or trade.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with Division 1 requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with Division 1 requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bids, in accordance in Division 1 requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with Division 1 requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all Division 1 requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor (whose proposal is also being accepted).

    a. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question, or seeking clarification.
    b. The work has been accepted as the responsibility of the prime contractor directly.

1.8 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents includes all items necessary for the proper execution and completion of the Work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgement of the Architect expressed in writing is equal to that specified.

C. Coordinate and properly relate all Work of this Division to building structure and work of all other trades.

D. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with Division 0.

E. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information or determining rough-in requirements from physically examining the existing equipment, receiving specific cut sheet information from the Owner's representative, other trades and/or Architect. Rough-in services for "NIC" equipment as required, as the work progresses.

F. Provide storage and protection for all equipment and materials in accordance with requirements of Division 0 and Division 1. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to Owner.

G. Keep premises clean in accordance with requirements of Division 0 and Division 1.

1.9 VALUE ENGINEERING (V/E):

A. Value Engineering (V/E) defined: For purposes of Division 23 and 26 Specifications, in accordance with all Division 1 Requirements and all Terms and Conditions of proposed contract between Owner and Contractor, Value Engineering (V/E) shall be defined as a "post bid" process, whereby the apparent low bidder (having submitted a proposal in strict accordance with Project Contract Documents, that exceeds the Owner's available funds for construction [AFC] for this specified project offers proposed changes ("Value Engineering") to the work. This proposed value engineering may alter or adjust aforementioned contract document requirements in exchange for financial and/or other consideration (in response to a specific request by the Owner/Owner's Representative).

B. Value Engineering may not be considered, prior to scheduled receipt and review of Bid Proposals by the Owner and an official written request from the Owner/Owner's Representative expressing the Owner's desire to consider value engineering items.

C. While it may be in the project Owner's interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, Division 23 contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance) with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

D. Should contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, Division 23 contractor shall provide duly licensed professional engineering consultants working on behalf of the Division 23 contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for performance and suitability of V/E hybrid systems, materials or operational changes related to

respective V/E items. The Division 23 contractor's licensed professional engineering consultants and the Division 23 contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as Division 23 contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

E. Division 23 contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the Division 23 contractor's (V/E Items)professional of record (either employees, or independent consultants to the Division 23 contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the Division 23 systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and their original use of Engineering Seals used for original Contract Documents, shall not apply.

1.10 SUBSTITUTIONS

A. Substitutions are only allowed by approval of the Architect prior to Bid Date as stipulated in Division 0 and/or Division 1.

B. Design of systems is based on specific equipment. If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by manufacturer of substituted equipment. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, their equipment with different model numbers shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from Contract Document requirements. Furnish all options specified or reasonably implied from the contract documents. Specifically identify any variance is regard to submittal versus specified performance on the cover sheet of each submittal.

1.11 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated and functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items. Should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

D. Furnish all plumbing fixtures (with required accessories) shown on either the plumbing drawings or the architectural drawings. Review Architectural casework elevations and identify fixtures indicated. Provide fixtures indicated. Rough-in for all fixtures as work progress. Verify plumbing fixtures required from review of Mechanical and Architectural drawings. prior to fixture shop drawing submittal.

E. In the event of a conflict between drawings and specifications, the more stringent interpretation shall govern.

F. Refer to Architectural portions of these contract documents for all flashing requirements and requirements for sealing penetrations of the building envelope, partitions, and related finishes or building surface. All penetrations shall be sealed, to resist air water, and water vapor movement through envelop in accordance with manufacturer requirements for this climate region or as required elsewhere in these specifications. Maintain all smoke or fire ratings with penetration sealing approach utilized in accordance with applicable codes/standards. All penetrations shall be sealed - coordinate responsibilities with prime bidder.

1.12 CODES AND REGULATIONS

A. Work shall be in full accord with the most stringent interpretation of the State Sanitary Code, local ordinances, building codes, and other applicable national, local, and state regulations.

B. Equipment shall conform to requirements and recommendations of the National bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1

D. In the possible event of conflict between codes or regulations and Contract Documents, the most stringent interpretation of either shall govern (provided if exceeds the requirements of other codes. In the event of an irreconcilable difference between codes or regulations notify the Architect/Engineer immediately.

E. In addition to the codes heretofore mentioned, all mechanical work and equipment shall conform to the applicable portions of the following specifications, codes and/or regulations:

1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
2. 2005 National Electrical Code (NEC)
3. National Fire Protection Association (NFPA)
4. American Society of Mechanical Engineers (ASME)
5. American Gas Association(AGA)
6. Underwriters Laboratories (UL)
7. 2012 International Mechanical Code (IMC)
8. 2013 Louisiana State Plumbing Code (LSPC)
9. 2012 International Building Code (IBC)

F. All materials, equipment and accessories installed under this Contract shall conform to all rules, codes, etc. as recommended by National Associations governing the manufacturer, rating and testing of such materials, equipment and accessories. All materials shall be new and of the best quality and first class in every respect. Whenever directed by the Architect, the Contractor shall submit a sample for approval before proceeding.

G. Where laws or local regulations provide that certain accessories such as gauges, thermometers, relief valves and parts be installed on equipment, it shall be understood that such equipment be furnished complete with the necessary accessories, whether or not called for in these Specifications.

H. All unfired and fired pressure vessels shall be built in accordance with the A.S.M.E. Code and so stamped. Furnish shop certificates for each vessel. Contractor shall provide and pay for first operating certificate as per State Fire Marshal Regulations.

1.13 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees. Local permits are not required for state projects.

B. Pay any and all taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

C. All permits, fees, certificates, etc. for the installation, inspections, plan review, service connections locations, and/or construction of the work which are required by any authority and/or agencies having jurisdiction, shall be obtained and paid for by the Contractor.

D. The Contractor shall make all tests required by the Architect, Engineer or other governing authorities at no additional cost to the Owner.

E. The Contractor shall notify the Architect and local governing authorities before any tests are made, and the tests are not to be drawn off a line covered or insulated until examined and approved by the authorities. In event defects are found, these shall be corrected and the work shall be retested.

F. Prior to requesting final inspection by the Architect, the Contractor shall have a complete coordination and adjustment meeting of all of his sub-contractors directly responsible for the operation of any portion of the system. At the time of this meeting, each and every sequence of operation shall be checked to assure proper operation. Notify the Architect in writing ten (10) days prior to this meeting, instructing him of the time, date and whom you are requesting to be present.

G. This project shall not be accepted until the above provisions are met to the satisfaction of the Architect.

1.14 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.15 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of Division 0/and or Division 1.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where approved manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document requirements, specifically call such deviations to attention of Architect on submittals. Type deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

1.16 REVIEW OF MATERIALS:

A. Whenever manufacturers or trade names are mentioned in these Plans or Specifications, the words "or approved equivalent" shall be assumed to follow whether or not so stated. Manufacturers or trade names are used to establish a standard of quality only, and should not be construed to infer a preference. Equivalent products which meet the Architect's approval will be accepted; however, these products must be submitted to the Architect a minimum of ten (10) days prior to the Bid Date.Submission shall include the manufacturer's name, model number, rating table and construction features.

B. Upon receipt and checking of this submittal, the Architect will issue an addendum listing items which are approved as equivalent to those specified. THE CONTRACTOR SHALL BASE HIS BID SOLELY ON THOSE ITEMS SPECIFIED OR INCLUDED IN THE "PRIOR APPROVAL ADDENDUM", AS NO OTHER ITEM WILL BE ACCEPTABLE.

C. Prior approval of a particular piece of equipment does not mean automatic final acceptance and will not relieve the Contractor of the responsibility of assuring himself that this equipment is in complete accord with the Plans and Specifications and that it will fit into the space provided. Shop drawings must be submitted on all items of equipment for approval as hereinafter specified.

D. Before proceeding with work and/or within thirty (30) days after the award of the General Contract for this work, the Mechanical Contractor shall furnish to the Architect complete shop and working drawings of such apparatus, equipment, controls, insulation, etc. to be provided in this project. These drawings shall give dimensions, weights, mounting data, performance curves and other pertinent information.

E. The Architect's approval of shop drawings shall not relieve the Contractor from the responsibility of incorrectly figured dimensions or any other errors which may be contained in these drawings. Any omission from the shop drawings or specifications, even through approved by the Architect, shall not relieve the Contractor from furnishing and erecting same.

F. Seven (7) sets of bound shop drawings shall be submitted to the Architect for approval. These submittals shall be supplied as part of this Contractor's contract. Any drawings not approved shall be resubmitted until they are approved. SUBMIT ALL SHOP DRAWINGS AT THE SAME TIME. NO SEPARATE ITEMS WILL BE ACCEPTED.

G. Submit two (2) prints of all mechanical room layouts showing locations of all equipment, piping, etc. to insure all will fit in space provided. Submit drawings at 1/4" scale.

1.17 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with requirements of Division 0 and/or Division 1.

B. Prepare electronic record document set in most current Autocad release available. Furnish one set of electronic record document (Autocad files) to Engineer and one set of Owner’s Representative.

C. During construction period, keep accurate records of installations made under this Division, paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

D. The Contractor shall obtain at his cost, two sets of blueline prints of the original bid documents by the Architect. One set shall be kept on the site with all information as referenced below, and

shall update same as the work progresses. The other set will be utilized to record all field changes to a permanent record copy for the Owner.

E. If the Contractor elects to vary from the Contract Documents and secures prior approval from the Architect for any phase of the work, he shall record in a neat and readable manner, ALL such variances on the blueline print in red. The original bluelines shall be returned to the Architect for documentation.

F. All deviations from sizes, locations, and from all other features of the installations shown in the Contract Documents shall be recorded.

G. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions and the like, as well as other features of the work which will be concealed underground and/or in the finished building.

H. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc., and by properly referenced centerline or invert elevations and rates of fall.

I. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building near which it was actually installed. The Architect's/Engineer's decision in this matter will be final.

J. The following requirements apply to all "As-Built" drawings:

1. They shall be maintained at the Contractor's expense.
2. All such drawings shall be done carefully and neatly, and in a form approved by the Architect/Engineer.
3. Additional drawings shall be provided as necessary for clarifications.
4. These drawings shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Architect/Engineer; and when necessary, to establish clearances for other parts of the work.
5. "As-built" drawings shall be returned to the Architect upon completion of the work and are subject to approval of the Architect/Engineer.

1.18 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of Division 2, Site Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid. Give Owner' Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative inspection and as subsequently found to be deficient, the trenches shall be uncovered,

C. Inspected, and then re-filled, if requested by Owner's Representative.

D. Provide minimum 18 inches of cover or in compliance with local published frost line data (if greater than 18 inches) to finish grades or paving at water piping.

E. For piping, provide bell holes at trench bottom to assure uniform bearing. Accurately grade trench bottoms by instrument before laying any pipe.

F. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers.

G. Compact fill to satisfaction of Architect and/or Owner's Representative.

1.19 CUTTING AND PATCHING

A. Comply with requirements of Division 0 and Division 1 regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Where return air plenums above ceilings are utilized, Division 23 Contractor shall ensure that return air openings are provided in walls run to deck, for proper return air flow back to the AHU. Cut walls as required to provide openings sized for maximum 1000 feet per minute air flow velocity through openings above ceiling. Provide a fire damper at openings of fire walls and a smoke damper at openings of smoke walls, in accordance with Division 23 details. Division 23 contractor shall provide (where necessary) for proper return airflow and coordinate electric or pneumatic services to smoke dampers via automatic temperature control/EMS Contractor, as required.

D. Repairing Roadways and Walks: Coordinate all roadway work with authorities having jurisdiction. Cut and/or bore under roadways for connection of utilities as required. Coordinate work through General Contractor. Where this contractor cuts or breaks roadways or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

E. Seal all penetrations of building envelope air and water tight. For complete closure of openings, where necessary, provide 1/8" thick elastomeric barrier anchored to materials penetrating building envelope and adjacent envelope surfaces involved - seal connections with caulk and mechanical fasteners. Refer to Architectural Sections on Joints and sealants. Seal all conduit systems communicating between conditioned and unconditioned spaces. Coordinate all work with and through prime bidder and other trades. Unless otherwise directed, caulk sealant shall be long lasting polyurethane based products, resistant to UV exposure, installed in accordance with manufactures instructions. Sealant joints shall withstand building pressure variance with respect to ambient of 0.25 inches water gauge, with no leakage in terms of air and or water vapor.

1.20 PAINTING

A. Painting shall be provided under Division 9, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additional cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. Paint all exposed piping inside and outside of building. Label all piping after painting as required. Utilize industry standard paint colors for respective system unless directed otherwise by Architect. Review proposed color scheme with Division 23 Requirements prior to ordering materials.

E. All piping shall be color coded per the following: (Coordinate colors with NSU):

1.	Water Chilled Water Piping	Blue
2.	Hot Water Heating Piping	Green
3.	Domestic Cold Water Piping	White
4.	Domestic Hot Water Piping	Silver
5.	Fire Protection Piping	Red
6.	Natural Gas Piping	Yellow

F. Ensure all exposed materials and equipment (tanks, storage vessels, components, panels, enclosures, etc.) are primed and painted with finish coats and protected from corrosion in accordance with manufacturer's recommendations for maximum life expectancy in ambient conditions/environment in which installed, unless furnished with a metal corrosion resistant surface such as polished or brushed stainless steel, copper, or aluminum. Clearly identify such surfaces in submittal associated with each specific component furnished by Division 23.

1.21 DIVISION 23 EQUIPMENT START-UP

A. All equipment furnished under Division 23 shall be started by factory trained personnel qualified to start said equipment. Training shall meet or exceed manufacturer's recommendation for respective equipment. Installing contractor shall provide start-up documentation in accordance with manufacturer's recommendations, or as required elsewhere in these specifications, indicating date of start-up. Coordinate start-up testing, adjusting and balancing procedures with respective subcontractors and commissioning personnel, owner's representatives and A/E design members as required to leave equipment in good working order in compliance with basis of design - design intent.

1.22 CLEANING AND ADJUSTING:

A. Upon completion of his work, the Contractor shall clean and adjust all equipment, controls, valves, etc.; clean all piping, ductwork, etc.; and leave the entire installation in good working order.

1.23 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

B. COPIES OF SHOP DRAWINGS WILL NOT BE ACCEPTABLE AS OPERATION AND MAINTENANCE INSTRUCTIONS.

C. This information shall be bound in plastic hardbound notebooks with the job name, Architect and Engineer names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Architect for approval.

D. In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

E. The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract.

1.24 GUARANTEE

A. The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall exclude only the changing or cleaning of filters. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

B. If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect for his approval.

1.25 LOCAL CONDITIONS

A. The location and elevation of all utility services is based on available surveys and utility maps and are reasonably accurate; however, these shall serve as a general guide only, and the Contractor shall visit the site and verify the location and elevation of all services to his satisfaction in order to determine the amount of work required for the execution of the Contract.

B. The Contractor shall contact the various utility companies, determine the extent of their requirements and he shall include in his bid all lawful fees and payments required by these companies for complete connection and services to the building, including meters, connection charges, street patching, extensions from meters to main, etc.

C. In case major changes are required, this fact, together with the reasons therefor, shall be submitted to the Architect, in writing, not less than seven (7) days before the date of bidding. Failure to comply with this requirement will make the Contractor liable for any changes, additions and expenses necessary for the successful completion of the project.

1.26 MINOR DEVIATIONS

A. Plans and detail sketches are submitted to limit, explain and define conditions, specified requirements, pipe sizes and manner of erecting work. Structural or other conditions may require certain modifications from the manner of installation shown, and such deviations are permissible and shall be made as required. However, specified sizes and requirements necessary for satisfactory operation shall remain unchanged. It may be necessary to shift ducts or pipes, or to change the shape of ducts, and these changes shall be made as required. All such changes shall be referred to the Architect for approval before proceeding. Extra charges shall not be allowed for these changes.

B. The Contractor shall realize that the drawings could delve into every step, sequence or operation necessary for the completion of the project, without drawing on the Contractor's experience or ingenuity. However, only typical details are shown on the Plans. In cases where the Contractor is not certain about the method of installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

C. In general, the drawings are diagrammatic and the Contractor shall install his work in a manner so that interferences between the various trades are avoided. In cases where interferences do occur, the Architect is to state which item was first installed.

1.27 VALVE TAGS

A. Secure metal tags to all valves. Labeling on all valve tags shall include type of system the valve controls and the area of building, zone, or equipment number affected by valve operation. Tag shall be 2"minimum diameter brass, engraved with code number, service and size. A framed list

of the valves, giving manufacturer's name, model number, type and location shall be mounted in the main basement equipment room.

1.28 MACHINERY GUARDS

A. This Contractor shall provide v-belt guards for each v-belt drive or other hazardous drive. The guard shall enclose the drive entirely and shall have a hole for taking a tachometer reading.

LABELING MECHANICAL EQUIPMENT

B. All mechanical equipment (A/C units, air handlers, chillers, pumps, exhaust fans, supply fans, boilers, fan coil units, VAV, water heaters, etc.) furnished under Division 23 of contract documents shall be labeled with permanent laminated plate secured to equipment. Units shall be labeled as indicated on plans and schedules.

1.29 TEMPORARY HEATING & AIR CONDITIONING

A. Permanent building air conditioners are not designed to control temperature and humidity at the levels usually encountered during construction of the building. The building's HVAC system is not designed nor is it well suited for the proper drying of building/construction materials, and should not be used for such purpose.

B. At all times, provide temporary ventilation both for comfort and protection of workers, for proper drying of wet work, and for proper curing of installed materials. Follow manufacturer's published instructions with regard to installation of building materials.

C. Provide temporary heat both for the comfort and protection of workers and as necessary to ensure suitable working conditions for construction operations of construction trades, and also as necessary for storage of products and materials. Refer to individual specification sections for environmental operational temperature and humidity requirements.

1. Provide temporary heat by use of self-contained, vented portable heating units, employing tanked gas or other approved heat source.
2. Use only heating apparatus and fuels labeled or listed by a "National Recognized Testing Laboratory" recognized by OSHA. Keep equipment and surroundings in clean, safe conditions.
3. Use flame resistant tarpaulins and other materials for temporary enclosures of space.

D. Provide temporary humidity control by the use of small incremental de-humidifiers, packaged desiccant type de-humidifiers, and/or packaged DX type air conditioners.

E. Do not permit space temperatures to reach or fall to a level which will cause damage to Work. Coordinate the temperature and humidity requirements with the manufacturer of the finishes being provided.

F. Replace interior or exterior surfaces damaged by the use of temporary heaters with new materials or refinish at no additional expense to Owner.

G. As soon as practical after permanent heating, ventilation, and air circulation systems are in place and operable, the Contractor at his option, may provide heat from the permanent building heating system, until such time that the building is complete. It is however, highly suggested that the building's permanent heating and air conditioning systems not be utilized to maintain temperature and humidity conditions within the building. Small space heaters and portable de-humidifiers are suggested as sources of temperature and humidity control. It is the intent of this Article that the permanent HVAC systems should not be used to condition or control humidity during construction.

1. The use of HVAC systems however, will require that the systems be complete and fully controllable by the Building Automation System (BAS) including the ability to remotely alarm proper maintenance personnel in the event of any and all system failure(s) or inability to maintain setpoint temperatures and humidity levels. Should the Contractor elect to utilize the building's permanent HVAC system, the Contractor shall bring the HVAC systems and ductwork back to an original unused condition or state by thoroughly cleaning and/or repairing both equipment and ductwork including repair and refinishing scrapes, tears, scratches and dents.
2. All dust, dirt, fungal growth, and debris in duct work shall be cleaned as per new.
3. All disposable or wearable parts such as belts, filters, etc., shall be replaced without option or cause.

H. Contractor's Use of Permanent HVAC Systems:

1. Heating System:
   a. Although highly discouraged, the Contractor may, (at his option and at his own risk), utilize the building's permanent heating systems provided under this Contract to provide space heating prior to Project completion date subject to the restraints stated above.
   b. The fuel for such space heating and for required tests of heating equipment shall be provided by Contractor. All utilities are furnished by the campus.
   c. The start up of equipment for use by the Contractor shall not commence any warranty period.
   d. The heating system shall be operated only by qualified personnel, and shall be operated with all auxiliaries, safeties, and in accordance with manufacturers' instructions and good operating practice.
   e. If at any time the Owner's Representative determines that the equipment is being improperly operated or maintained, Contractor may be directed to disconnect its use.
   f. Heating systems shall be operated and controlled to prevent temperature in any room or space in any building from exceeding 90 deg. F.
   g. Temperature controls shall be functional to the extent that the operating temperatures of equipment, ductwork, piping, etc., shall not either fall or be elevated above or below normal operating limits. The Contractor shall demonstrate to the Owner or his representative the ability of the system to be controlled, including limit alarms installed and the ability to monitor the systems off-site.
   h. Systems shall not be operated unattended such as on holidays, weekends, nights, etc., nor shall personnel unfamiliar with the operation of the HVAC Systems be employed to "monitor or attend to" the systems such as security personnel, or janitorial staff. The heating system, when in operation, shall be continuously monitored by Division 23 Contractor's approved personnel.
   i. Systems when activated, may be placed into operation without diffusers and registers in place, but filters capable of filtering gypsum dust or other associated construction dust and debris shall be provided both in air handling equipment and at return air grille locations. Filter all return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty. Air handling units shall have permanent filters in place before any operation.
   j. Contractor shall, prior to final acceptance of the Work, place heating systems and related equipment in a condition equal to new in that Contractor shall clean all ductwork, coils, equipment, etc.
   k. Contractor shall also drain, flush, inspect all strainer screens, and replace hot water heating water and shall recharge with new chemicals.
   l. The piping systems shall be thoroughly flushed.

m. All necessary chemicals and/or additives shall be added, checked, and maintained to the system prior to startup and during operation of the system.

n. All disposable or wearable parts such as belts, filters, etc., shall be replaced without option or cause.

2. Preliminary Heating Test & Balance Report:

a. The Contractor shall provide to the Owner's Representative a preliminary Test & Balance Report at the time of the heating system(s) start-up indicating the following conditions:

(i) Air pressure drop across the unit filters
(ii) Air pressure drop across the unit's cooling coil(s)
(iii) Air pressure drop across the unit's heating coil(s).
(iv) Total static pressure produced by the unit
(v) Discharge air static pressure
(vi) Fan RPM.
(vii) Suction air pressure
(viii) Provide a unit pressure graph.
(ix) Discharge air temperature (each air moving device).
(x) Return air temperature (each air moving device).
(xi) Entering water temperatures (hot & chilled)
(xii) Leaving water temperatures (hot & chilled).
(xiii) Water flow quantity (gpm) through the coil(s) (hot & chilled).

b. Air Conditioning Systems:

(i) Although highly discouraged, the Contractor may (at his option and at his own risk), utilize the building's permanent air conditioning systems provided under this Contract to provide space cooling and de-humidification prior to the Project completion date. As such, any damages, loss of performance, wear, and other detrimental effects caused by the operational performance characteristics of the A/C system such as condensation, sweating of grilles, registers, diffusers, ducts, equipment, walls, floors, ceilings, and other conditions which may cause damage to building components or which cause mold, mildew, etc., shall be the total responsibility of the Contractor.
(ii) The fuel, electricity or other energy required for space cooling and for any subsequent operation or testing shall be provided by the Contractor.
(iii) The cooling system(s) shall be operated only by fully qualified personnel and shall be operated with all safety auxiliaries, and in accordance with manufacturer's instructions and good operating practice.
(iv) The piping systems shall be thoroughly flushed.
(v) All necessary chemicals and/or additives shall be added, checked, and maintained to the system prior to startup and during operation of the system.
(vi) Start up of equipment for use by the Contractor shall not commence any warranty period.
(vii) If at any time the Owner's Representative determines that the equipment is being improperly operated or maintained, the Contractor can be directed to discontinue and disconnect its use and the Contractor will be required to provide portable units to maintain space temperatures.
(viii) Temporary cooling and/or de-humidification systems shall be operated and controlled to prevent temperature and humidity in any room or space in any portion of the building from falling below 75 deg. F or above 65% relative humidity.
(ix) Temperature controls shall be functional to the extent that the operating temperatures of equipment, ductwork, piping, etc., shall not

fall below the normal stated "design"operating limits. The Contractor shall demonstrate to the Owner or his representative the ability of the system to be controlled, including limit alarms installed and the ability to monitor the systems off-site.

(x) Insulation systems for all piping, ductwork, etc., shall be completely installed prior to use of the permanent systems.

(xi) Systems shall not be operated unattended such as on holidays, weekends, nights, etc., nor shall personnel unfamiliar with the operation of the HVAC Systems be employed to "monitor or attend to" the systems such as security personnel, or janitorial staff. The air conditioning system, when in operation, shall be continuously monitored by Division 23 Contractor's approved personnel.

(xii) Systems when activated, may be placed into operation without diffusers and registers in place, but filters capable of filtering gypsum dust or other associated construction dust and debris shall be provided both in air handling equipment and at return air grille locations. Filter all return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty.

(xiii) Contractor shall, prior to final acceptance of the Work, place cooling systems and related equipment in a condition equal to new in that Contractor shall clean all ductwork, coils, equipment, etc.

(xiv) Contractor shall also drain, flush, inspect all strainers and screens, and replace chilled water and condenser water and shall recharge with new chemicals.

(xv) All disposable or wearable parts such as belts, filters, etc., shall be replaced without option or cause.

c. Preliminary Air Conditioning Test & Balance Report:

(i) The Contractor shall provide to the Owner's Representative a preliminary Test & Balance Report at the time of start-up of the air conditioning system(s) indicating the following conditions:

1) Air pressure drop across the unit filters
2) Air pressure drop across the unit's cooling coil(s).
3) Air pressure drop across the unit's heating coil(s).
4) Total static pressure produced by the unit.
5) Discharge air static pressure.
6) Fan RPM.
7) Suction air pressure.
8) Provide a unit pressure graph.
9) Discharge air temperature.
10) Return air temperature. Entering water temperature (hot & chilled).
11) Leaving water temperature (hot & chilled).
12) Water flow quantity (gpm) through the coil(s) (hot & chilled).

PART 2 - PRODUCTS

2.1 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 1.

B. Provide the following operations and maintenance data:

1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.

2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
3. Provide a minimum of five (5) days of instruction in operation and maintenance of equipment to Owner's Representative maintenance force. Design a 2-week period, convenient to Owner's Representative, during which qualified personnel, including manufacturers' technicians and authorized factory trainers shall be available for Architect/Owner's Representative instruction.

2.2 RECORD DRAWINGS

A. Provide "Record Drawings" in accordance with the General Conditions Governing all Contracts, indicating in a neat and accurate manner a complete record of all revisions of the original design of the work.

1. Include all changes and provide for an accurate record, on reproductions of the Contract drawings or on appropriate shop drawings, all deviations between the work shown and work installed.

B. Submit for approval bound sets of the required drawings, manuals and operating instructions.

2.3 IDENTIFICATION MARKINGS

A. General: Apply identification tags, markers, etc. after insulation and field painting are completed.

PART 3 - EXECUTION

3.1 COORDINATION AND LAYOUT

A. Study Drawings and Specifications to insure completeness of work required.

1. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete work, though not specifically indicated or specified.

B. Verify measurements and conditions in field before starting work.

C. Examine materials to which work is to be applied and notify the Architect/Owner's Representative, in writing, of any conditions existing which are detrimental to proper and expeditious installation of work.

1. Starting of work shall be construed as acceptance of conditions.

D. Confer with other trades, install work to avoid interference with other trades, and possible necessary adjustments to conform to structural conditions and work of other trades.

E. Coordinate and set inserts and locate openings in floors and walls in new construction.

1. Locate pipes and ducts to avoid interference with other work shown on the drawings and as directed by the Architect/Owner's Representative.
2. Keep all concealed pipes and ducts within the enclosing construction provided.
3. Arrange exposed work neatly in parallel runs and parallel with walls or structure, with uniformly spaced hangers and supports, and within the spaces assigned for each kind of work.

F. Make coordinated layouts showing concrete work required for housekeeping pads, equipment bases and inertia masses which are cast in place, including the location of anchors and dowels.

1. Coordinate the scheduling and placing of the concrete to suit the mechanical work schedules.
2. Concrete housekeeping pads are to cover the full area of each piece of equipment.
3. Concrete bases are to be of dimension and heights to suit the equipment.
4. The forming and placing of concrete shall be provided under this specification section.

3.2 MAINTENANCE OF EQUIPMENT AND SYSTEM PRIOR TO FINAL ACCEPTANCE

A. Maintain all installed equipment and systems in accordance with the manufacturer's published instructions, until final acceptance by the Architect/Owner's Representative, and take such measures as necessary to insure adequate protection of all equipment and materials during delivery, storage, installation, operating and shut-down conditions.

1. This responsibility shall include all provisions required to meet the conditions incidental to the delays pending final test of systems and equipment.
2. Maintain and periodically clean all equipment until final acceptance.

B. After installation of systems has been completed, operate the system to determine the capability of the equipment and controls to conform to the requirements of the drawings and specifications prior to performance testing.

3.3 DAMAGED EQUIPMENT

A. Any and all equipment, parts, components, etc., provided under this division which is damaged by the contractor or which is received in damaged condition during shipping, transit, handling, or during installation shall be replaced. Dented, or damaged non-structural equipment jackets or surface casings such as but not limited to water heater jackets, boiler jackets, chiller insulation jackets, etc., shall either be repaired or replaced at the option of the Owner's Representative. If repaired, the finished product shall match original equipment exactly.

B. Any equipment which develops surface rust, either through improper storage, handling or installation, shall be refinished by grinding the affected area down to bare (white) metal, then prepared with a rust preventive primer and finished with the original manufacturer's touch-up paint to match existing color.

3.4 EQUIPMENT INSTALLATION

A. Locate and set equipment anchor bolts, dowels and aligning devices for all equipment requiring them. Coordinate requirements of concrete work with General Contractor and other trades.

1. Level the equipment and grout solid between the equipment and the surface below. Grout to be premixed grout mixed in accordance with manufacturer's specifications.

B. The field assembly, installation and alignment of equipment is to be done under field supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.

C. Equipment startup.
1. Each manufacturer of equipment shall provide qualified personnel to inspect and approve equipment and to supervise the operating tests of the equipment. System commissioning shall be performed in accordance with ASHRAE standards.

D. Equipment and system test operation.

1. Note: Equipment and system test operation is separate and apart from additional requirements of "Training and Demonstration". Refer to individual sections for requirements regarding "Training and Demonstration". Notify the Owner's Representative in advance of beginning the equipment and system test operation. All equipment testing/demonstration shall be performed in the presence of the Architect/Owner's Representative. A minimum of seven (7) days notice is required before equipment and system testing.
2. Each piece of equipment shall be operated in its system as long as required to provide proper functioning.
3. Perform an operating test of each complete system for twenty-four hours continuous operation as a minimum, or as long as required to provide coordination and proper functioning of all related systems and controls.
4. The operating criteria for each test shall be determined in advance with the Owner's Representative approval whenever seasonal conditions shall not produce a full design load on any equipment or system.
5. Certify to the Owner's Representative that all equipment is functioning properly.
6. Should the apparatus fail to meet the Contract requirements, adjust, repair or replace all defective or inoperative parts and again conduct the complete performance tests.

3.5 CLEANING AND ADJUSTING OF SYSTEMS

A. Blow out, clean and flush each system of piping, and equipment as required to thoroughly clean the systems.

1. Clean all materials and equipment, and leave in condition ready to operate and receive succeeding finishes where required.
2. Adjust and align all equipment interconnected with couplings or belts.
   a. Adjust valves of all types and operating equipment of all types to provide proper operation.
   b. Remove and clean elements in all steam trap bodies.
   c. Clean all strainers. Replace temporary construction screens with new permanent screens.

B. Lubricate equipment as recommended by the manufacturer, during temporary construction use, and provide complete lubrication just prior to acceptance.

C. Permanent equipment operated during construction shall not be abused or be used in service different from its design application.

1. Temporary disposable filters shall be used during temporary operation.
2. All expendable media, including belts used for temporary operation and similar expendable materials shall be replaced just prior to acceptance.
3. Packing boxes of equipment operated during construction must be replaced just prior to system acceptance, using materials and methods specified by the supplying manufacturer.

D. Equipment furnished with factory finishes where damaged shall be retouched and repainted as required to present a new appearance.

E. Furnish and maintain protection for all of the work whether completed or in progress.

1. Furnish and install coverings and enclosures as required.

F. New and existing operating equipment and systems shall be clean and dust free inside and out.

1. Concealed and unoccupied areas such as plenums, pipe and duct spaces and Equipment Rooms shall be free of rubbish and swept, vacuumed or wiped clean at time of acceptance.

3.6 CONTRACTOR REQUESTED FIELD OBSERVATIONS

A. During the course of, and at stages appropriate to the progress of construction, the Contractor may request periodic field observations of the design professional. If the field observation is a request of and by the Contractor, the Contractor shall provide all necessary ladders, scaffolding, lifts, safety harnesses or other equipment in order for the Architect to safely and adequately perform the requested observations.

1. Requests for observations shall be made a minimum of seven (7) days in advance of the requested date of observation.
2. All equipment, ladders, lifts, safety nets, scaffolding, etc., shall be provided and in place for the use of the Architect.
3. All equipment panel covers, electrical panels, or other equipment shall be opened by the Contractor for viewing by the Architect.
4. The Contractor shall make available a mechanic or technician of that field in order to answer questions of the designer, make any and all adjustments and/or corrections and to assist the Architect.

3.7 TESTING AND BALANCING

A. Refer to Specifications Section 23 0593.

3.8 PAINTING

A. General painting is typically performed by the Division 9 contractor. This contractor shall however, either perform specialized painting as called for below in the following conditions or he shall advise the Contractor of these requirements as follows:

1. Thoroughly clean all surfaces, requiring prime painting, of rust, loose scale, oil and grease.
2. Dry surfaces before painting.
3. Do not paint controls, nameplates, labels or sprinklers.

B. Paint all equipment unless otherwise specified not to be painted at the factory with one prime coat of rust prohibitive paint.

C. Provide field painting as follows:

1. All exposed iron work, including un-insulated ferrous piping and conduit system components, hangers, supports, equipment bases, and apparatus; prime coat with a red lead free paint.
2. Un-insulated duct work and casing exposed to view and exposed galvanized surfaces of conduit and piping and of equipment prime painted at the shop: Prime coat, zinc chromate for galvanized surfaces.
3. Inside of all duct work where visible through registers and grilles: One coat of flat black paint.

3.9 CONNECTIONS TO EQUIPMENT

A. Provide mechanical connections to equipment and fixtures requiring such connections which are supplied by Architect/Owner's Representative or under other divisions.

B. Provide unions, nipples, adapters, valves, flexible connections, and other trim required for final connections for each such fixture or item of equipment, as required for complete operation, servicing, and maintenance.

3.10 WORKMANSHIP

A. Perform all work in a practical, neat and workmanlike manner with mechanics skilled in work, and using the best practices of the trade involved.

B. No work shall be concealed until it has been inspected and approved by the Architect/Owner's Representative.

C. Workmanship or materials not meeting with requirements of the specifications and drawings and satisfaction of the Architect/Owner's Representative shall be rejected and immediately replaced in an acceptable manner, without additional cost to the Architect/Owner's Representative.

3.11 LUBRICATION

A. All equipment furnished, installed or connected under this division, shall be inspected for proper lubrication when connected and before operation of the equipment is begun.

B. The Contractor for the work of this division shall be held responsible for any damage to equipment that is operated without having been properly lubricated.

3.12 USE OF PREMISES AND CLEANING

A. Remove and dispose of all waste materials and rubbish due to all construction operations under the Contract, except as otherwise noted, and keep the building free from rubbish and dirt caused by his and/or his Sub-Contractors' employees.

1. During the entire progress of the work, rubbish removal shall be made frequently so as to prevent any potential safety or health hazard.

B. Upon completion of the work, remove all protection, paint, putty, and other stains from all fixtures and glass and leave the premises thoroughly broom cleaned.

3.13 CUTTING, ALTERING AND PATCHING

A. Provide all cutting, chasing, drilling, altering and rough patching required for the work of this division.

B. Do all shoring, bracing, cutting, patching, piecing out, filling in, repairing and refinishing of all present work as made necessary by the alteration and the installation of new work.

C. All holes and openings occurring in the existing floors after equipment, partitions, floors, steel work, conduits and pipes are removed or installed shall be closed up with materials similar to the adjacent work.

D. The size and location of items requiring an opening, chase or other provisions to receive it shall be given by the trade requiring same in ample time to avoid undue cutting of any new work to be installed. These provisions shall not relieve the Contractor from keeping other trades informed as to the required opening, chases, etc., nor from responsibility for the correctness thereof, nor for cutting and repairing after the new work is in place.

E. Include all cutting, repairing and patching in connection with the work that may be required to make the several parts come together properly and fit it to receive or be received by the work of other trades, as shown on the drawings and/or specified, or reasonably implied by the drawings and specifications.

F. All repairing, patching, piecing-out, filling-in, restoring and refinishing shall be neatly done by mechanics skilled in their trade to leave same in condition satisfactory to the Architect/Owner's Representative.

G. Materials and their methods of application for patching shall comply with applicable requirements of the specifications.

1. Materials and workmanship not covered by the specifications and items of work exposed to view adjoining existing work to remain shall conform to similar materials and workmanship existing in or adjacent to the spaces to be altered.

H. Cutting, repairing and patching shall include all items shown on the drawings, specified in the specifications or required by the installation of new work or the removal of existing work.

I. Remove partitions, walls, suspended ceilings, etc., as necessary to perform the required alterations or new construction work.

1. Avoid damage to construction and finishes that are to remain.

J. Protect and be responsible for the existing building, facilities and improvements if any.

1. Any disturbance or damage to the work, the existing building, and improvements, or any impairments of facilities resulting from the construction operations, shall be promptly rectified, with the disturbed, damaged, or impaired work, restored, repaired or replaced at no extra cost.

K. All alterations which are not indicated on the drawings nor specified herein but necessary to make good existing work disturbed by reason of the work shall be restored to a condition satisfactory to the Architect/Owner's Representative.

L. All holes in masonry floors and walls are to be core drilled.

M. Disturbed concrete and /or cement floor areas shall be patched with approved type latex mortar.

1. When cement mortar is used for patching, the surfaces shall be depressed a minimum depth of one inch (1").

N. Reinstall all weather protection work in waterproof manner.

O. Openings in roofs:

1. Openings in roofs shall be kept properly plugged and caulked at all times, except when being worked on, to preclude the possibility of flooding due to storms or other causes. After completion of work, openings shall be permanently sealed.

P. Temporary openings.

1. All temporary openings cut in walls, floors or ceilings for pipe or duct work shall be closed off with transite or an equally non-combustible material except when mechanics are actually working at the particular opening.

3.14 USE OF PERMANENT SYSTEMS:

A. Heating System:

1. The Contractor may, at his option, utilize the permanent heating systems provided under this Contract to provide space heating prior to Project completion date. The fuel for such space heating and for required tests of heating equipment shall be provided by Contractor.
2. The heating system shall be operated only by qualified personnel, and shall be operated with all auxiliaries, and in accordance with manufacturers' instructions and good operating practice. If at any time the Owner's Representative determines that the equipment is being improperly operated or maintained, Contractor may be directed to disconnect its use.
3. Heating systems shall be operated and controlled to prevent temperature in any room or space in any building from exceeding 90 deg. F.
4. Systems may be activated without diffusers and registers in place, but filters with same efficiency as those specified shall be provided both in air handling equipment and at return air grille locations. Filter return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty.
5. Contractor shall, prior to final acceptance of the Work, place heating systems and related equipment in a condition equal to new.

B. Air Conditioning System:

1. The Contractor may, at his option, utilize the permanent air conditioning systems provided under this Contract to provide space cooling prior to the Project completion date.
2. The fuel, electricity or other energy required for space cooling and for any subsequent operation or testing shall be provided for by the Contractor. All utilities are furnished by the campus.
3. The cooling system shall be operated only by fully qualified personnel and shall be operated with all auxiliaries, and in accordance with manufacturer's instructions and good operating practice. Start up of equipment for use by the Contractor shall not commence any warranty period.
4. Cooling systems shall be operated and controlled to prevent temperature in any room or space in any building from falling below 70 deg. F.
5. Systems may be activated without diffusers and registers in place, but filters with same efficiency as those specified shall be provided both in air handling equipment and at return air grille locations. Filter all return air entering duct work, to prevent return air duct work from accumulating dust or otherwise becoming dirty. Air handling units shall have permanent filters in place before any operation.
6. Contractor shall, prior to final acceptance of the Work, place cooling systems and related equipment in a condition equal to new.

3.15 PENETRATIONS THROUGH FIRE SEPARATIONS

A. Pack annular space between sleeve and pipe (insulation) and / or conduit in fire rated construction with fire retardant putty, sealant and / or caulk in accordance with listed assemblies utilized on the project. Material shall be non-asbestos based and installed in accordance with manufacturers instructions for fire rating required.

B. Penetrations of multiple items and penetrations with annular space greater than 1/2" shall be provided with approved backing material in accordance with manufacturers instructions.

C. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.

END OF SECTION 23 00 10

SECTION 23 00 20 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 23. It expands and supplements the requirements specified in sections of Division 1.

1.3 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing. Verify exact location and placement of all access panels with/through Architect prior to any equipment rough-in.

B. Extend all grease fittings to an accessible location.

C. Refer to the Division 8 Section: Access Doors.

1.4 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 23 for rough-in requirements.

1.5 MECHANICAL INSTALLATIONS

A. Coordinate mechanical equipment and materials installation with other building components.

B. Verify all dimensions by field measurements.

C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

G. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

H. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

I. Coordinate the installation of mechanical materials and equipment above ceilings with suspension system, light fixtures, and other installations.

J. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.6 MECHANICAL COORDINATION DRAWINGS

A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing and maintaining insulation, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.

B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Mechanical equipment room layouts;
2. Specific equipment installations, including:
   a. Ductwork and diffusers;
3. Work in pipe spaces, chases, trenches, and tunnels;
4. Exterior wall penetrations;
5. Ceiling plenums which contain piping, ductwork, or equipment in congested arrangement;
6. Installations in mechanical riser shafts, at typical sections and crucial offsets and junctures;
7. Mechanical contractor shall furnish drawings, to general contractor, once approved by reviewing Architect, to fully coordinate with all trades and subcontractors required. Failure to fully coordinate via this process shall not relieve the contractor of his responsibility to coordinate structural supports, electrical service routing of mechanical systems and provisions for required access.

1.7 CUTTING PATCHING AND SEALING OF PENETRATIONS

A. This Article specifies the cutting and patching of mechanical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to the Division 1 Section: CUTTING AND PATCHING for general requirements for cutting and patching.

C. Refer to Division 26 Section for BASIC ELECTRICAL REQUIREMENTS for requirements for cutting and patching electrical equipment, components, and materials.

D. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

E. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

F. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

G. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. uncover Work to provide for installation of ill-timed Work;
2. remove and replace defective Work;
3. remove and replace Work not conforming to requirements of the Contract Documents;
4. remove samples of installed Work as specified for testing;
5. install equipment and materials in existing structures;
6. upon written instructions from the Architect, uncover and restore Work to provide for Architect observation of concealed Work.

H. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim, and other mechanical items made obsolete by the new Work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

K. Locate identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When transit services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

L. Seal all penetrations of building envelope air and water tight. For complete closure of openings, where necessary, provide 1/8" thick elastomeric barrier anchored to materials penetrating building envelope and adjacent envelope surfaces involved - seal connections with caulk and mechanical fasteners. **Refer to Architectural Sections on joints and sealants.** Seal all conduit systems communicating between conditioned and unconditioned spaces. Coordinate all work with and through prime bidder and other trades. Unless otherwise directed, caulk sealant shall be long lasting polyurethane based products, resistant to UV exposure, installed in accordance with manufactures instructions. Sealant joints shall withstand building pressures variance with respect to ambient of 0.25 inches water gauge, with no leakage in terms of air and or water vapor.

1.8 MECHANICAL SUBMITTALS

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 Section: SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES for submittal definitions, requirements, and procedures.

B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by The Contractor. Data submitted from subcontractors and material suppliers directly to the Architect will not be processed.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Refer to the Instructions to Bidders Page 1B-3 Paragraph 4.3 for requirements in selecting products and requesting substitutions.

2.2 PRODUCT LISTING

A. Prepare listing of major mechanical equipment and materials for the project. A sample schedule is included at the end of this Section to complete this requirement.

B. Provide all information requested.

C. Submit this listing as a part of the submittal requirement specified in the Division 1 Section: PRODUCTS AND SUBSTITUTION.

D. When two or more items of same material or equipment are required (plumbing fixtures, pumps, valves, air conditioning units, etc.) they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, ube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in Work, except as otherwise indicated.

E. Provide products which are compatible within systems and other connected items.

2.3 NAMEPLATE DATA

A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Locate nameplates in an accessible location.

2.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

2.5 RECORD DOCUMENTS

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or PROJECT RECORD DOCUMENTS for requirements. The following paragraphs supplement the requirements of Division 1.

B. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned

from column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e.,traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

C. Mark Specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

2.6 OPERATION AND MAINTENANCE DATA

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or OPERATION AND MAINTENANCE DATA for procedures and requirements for preparation and submittal of maintenance manuals.

B. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

2.7 WARRANTIES

A. Refer to the Division 1 Section: SPECIFIC WARRANTIES for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 15, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

2.8 CLEANING

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.

B. Refer to Division 230593 Section: TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

PART 3 - EXECUTION

3.1 RECORD DOCUMENTS

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or PROJECT RECORD for requirements. The following paragraphs supplement the requirements of Division 1.

B. Mark Drawings to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned for column lines; actual inverts and locations of underground piping; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e.,traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices.

C. Mark Specifications to indicate approved substitutions; Change Orders; actual equipment and materials used.

3.2 OPERATION AND MAINTENANCE DATA

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or OPERATION AND MAINTENANCE DATA for procedures and requirements for preparation and submittal of maintenance manuals.

B. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

C. Five copies of O & M Instructions, bound with screw posts, shall be provided. Each notebook shall have an identifying label under a clean plastic cover shield on the front cover. The label shall identify the project, Architect, Contractor, and date. The Contractor’s normal and after hour number shall be clearly identified on the front cover.

D. Use multiple binders if a single binder would exceed 2-1/2 inches in thickness; arrange the data in the same sequence as the specification sections; delete or mark through extraneous data.

E. Provide tab pages with metal or plastic reinforced holes to separate each major item or closely related group of items with typed item names on the tabs. Supply a table of contents at the beginning of each volume listing at items, the manufacturers and the name, address and phone number of the nearest authorized service representative.

F. A copy of the completed manual shall be submitted to the Contracting Officer one week before the user instruction for perusal. This copy will be returned to the Contractor with the user, comments. These comments shall be incorporated in the final copies of the manual. The Contractor shall obtain a signed receipt for the manual.

G. The O & M Manual outline shall be prepared in two parts along the lines suggested in the 1999 ASHRAE Handbook, Chapter 59.

H. All contents shall be project specific, typewritten.

3.3 WARRANTIES

A. Refer to the Division 1 Section: SPECIFIC WARRANTIES for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 23, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

3.4 CLEANING

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.

B. Refer to Division 23 Section: TESTING, ADJUSTING, AND BALANCING for requirements for cleaning filters, strainers, and mechanical systems prior to final acceptance.

END OF SECTION 23 00 20

SECTION 23 05 00 - BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work in this section includes furnishing and installing all piping for project as hereinafter described.

B. Related Work: All piping shall be coordinated with Plumbing, Air Conditioning and Ventilation section of these specifications.

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPE

A. Refrigerant lines 3/4" or greater shall be ACR hard copper pipe and fittings.
B. All exposed refrigerant lines, regardless of size, shall be ACR hard copper pipe and fittings.
C. Concealed refrigerant lines less than 3/4" may be ACR soft copper.
D. All refrigerant piping connections shall be brazed. Press fit connections are NOT approved. All brazing must be done with a nitrogen purge. The engineer at anytime may require removal of two fittings per system to verify that the nitrogen purge was done.

2.2 REFRIGERANT PIPE TESTING

A. Refrigerant lines shall be tested under 600 psi nitrogen pressure for 48 hours using soap suds at joints to test for leaks. After that, the refrigerant lines shall be tested with 500 microns vacuum for 1 hour. Evacuate system and charge with refrigerant.

2.3 CONDENSATE DRAIN LINES

A. Shall be Type L hard copper.

2.4 PIPE FITTINGS

A. All pipe fittings shall be same as piping specified unless indicated otherwise.

B. All screwed fittings and pipe shall have threads cut to standard pipe thread dimensions. Pipe shall be properly reamed after cutting of threads.

C. Joint compound, Crane Thread lubricant or equal, shall be applied to male threads of the screwed pipe and fittings only.

D. Approved expansion joints or flexible couplings shall be provided as necessary.

E. Care shall be taken in making up pipe and fittings such that pipe does not extend into fitting sufficiently to reduce the waterway.

F. Unions for use on above grade pipe larger than 2 inches shall be cast iron, screwed flanges, 125 pound flat face with 1/16" non-asbestos composition gasket.

G. All risers 3" or larger shall have a flanged joint at each floor.

H. Standard, one-piece reducing fittings of approved design shall be used wherever a change in size is made. Changes in pipe sizes shall not be made by means of reducing flanges.

2.5 PIPE HANGER AND SUPPORTS

A. This Contractor shall furnish and install all foundations and supports required for his equipment unless otherwise indicated on the drawings.

B. This Contractor shall furnish and install all escutcheons, inserts, thimbles, hangers, etc. required for the proper support and installation of his equipment and piping. Cooperate with other trades in locating and placing these items.

C. Provide sleeves for all pipes passing through walls, floors, beams, etc. Sleeves passing through structural members shall be of cast iron or Schedule 40 steel pipe. Sleeves passing through non-structural walls or floors shall be of 26 gauge galvanized iron. Joints between sleeves and pipes passing through floors shall be made watertight with plastic materials. Where pipes pass through waterproofing membrane, flashing sleeves shall be installed.

D. Provide Grinnell # 108, Fee and Mason Fig. 57, Carpenter & Patterson # 34, Michigan # 450, or equal malleable iron split ring hangers with rod supports throughout. Strap hangers or wire will not be accepted. Maximum spacing of hangers for cast iron pipes shall be 5'; for other than soil, use 10'.

E. Provide galvanized iron shields between hangers and pipe covering.

F. Provide Grinnell, Fee and Mason, Crane, or equivalent heavy steel riser clamps on vertical risers at floors to support pipes.

G. Provide chrome plated brass escutcheons wherever pipes pass through floors, walls or ceilings in exposed or finished areas.

H. All piping projecting from chases shall be rigidly supported in the wall or chase. Loosely supported fixtures or accessories will not be accepted.

END OF SECTION 23 05 00

SECTION 23 05 13 - MOTORS, MOTOR STARTERS AND ELECTRICAL WORK

PART 1 - GENERAL

1.1 GENERAL

A. The Mechanical Contractor shall furnish to the Electrical Contractor for installation, all motor starters, start-stop switches, pilot lights, etc., for each piece of motor driven equipment unless shown otherwise.

B. The Electrical Contractor shall install all motor starters, start-stop switches and pilot lights as furnished by the Mechanical Contractor. The Electrical Contractor shall also do all power wiring, and electrical terminations required for the installation of such mechanical equipment.

C. All electrical equipment shall have the UL label and shall meet the standards of the National Electrical Code and NEMA Rated. I.E.C. is not acceptable.

D. All starters and VFD's shall have "on-off-auto" selector switches, phase failure protection, and interface with building automation controls.

1.2 MOTORS

A. All motors on equipment shall be "Premium High Efficiency" type motors.

B. Motors shall be of the 40° rise type, Class F insulation, NEMA Design B and totally enclosed fan-cooled (TEFC) design as a minimum. All motors shall be wound for plus or minus 10% of the specified voltage.

C. Motors shall meet the following horsepower ratings, and minimum full load efficiencies (U.S. IEEE 122A)

Motor Hp	Minimum Full Load Efficiency (Nominal)
0-2	84%
3	85%
5	87%
7, 5, 10	89%
15	90%
20	91%
25, 30	92%
40 and above	93%

D. Motors shall have 1.15 service factor rating for 3-phase motors and 1.35 for single-phase motors.

E. Motors shall be as manufactured by Century III E-Plus, Marathon Series Premium Blue Chip XRI or approved equivalent.

F. Motors which are controlled/started by variable frequency drives (Inverters) shall be

Inverter Duty Motors. Motors shall be of the totally enclosed fan cooled (TEFC) type with Class F Insulation, ball bearings, Continuous Duty 40^{i} C Ambient, Cast Iron Frame, Class H magnet wire. Motors shall comply with NEMA MG1 Part 30/Part 31 requirements/specifications.

G. Motors shall be as Manufactured by Marathon Blue Max Inverter Duty or approved equivalent.

H. All motors shall be specifically designed for specific application specified (i.e. AHU, pump, etc.), and shall have built-in thermal overload protection.

I. The supplier shall provide a list of motors with nameplate data for each new motor submitted. Submit in shop drawings with associated motor efficiency.

1.3 MOTOR STARTERS

A. Refer to Electrical Plans and provide fusible type combination starter/disconnects where required.

B. Exception Manual starters can be furnished for fractional horsepower motors that are not controlled automatically or remotely. Refer to Temperature Controls section of these specifications and mechanical drawings to determine if fractional horsepower motors are controlled automatically or remotely.

C. Microprocessor-Based Motor Control Where specified under specific starter sizes, provide Microprocessor-based Motor Control as Specified herein. The microprocessor-based motor control shall meet the latest applicable sections of Underwriters Laboratories (UL) and National Electrical Manufacturers Association (NEMA).

1. Provide motor contactors with NEMA size 1 through 6 ratings as shown on the plans. Provide motor contactors with replaceable fixed and movable contacts. Provide contactors of the electro-mechanical type with the coil controlled by an application specific microprocessor. The microprocessor shall measure control circuit voltage and prevent closing of the coil on low voltage (78 volts ac) and/or high voltage (135 volts ac) conditions which are outside of the coil ratings.
2. Microprocessor shall apply voltage to the coil such that a guaranteed maximum of 2 milliseconds of main contact bounce occurs on contactor closure. The microprocessor shall continuously measure coil circuit voltage and current so as to maintain constant coil power at a level to maintain main contact closure and minimize coil power consumption. Provide electronic circuitry such that the coil is isolated from surges to the point where surge suppressers are not required. Manufacturer is to provide lifetime free coil replacement of any failed coil.
3. Microprocessor is to wait for three (3) half (½)-cycles of control start signal prior to activating a close to prevent starts resulting from momentary voltage spikes,

   switching transients, fluttering contacts, and shorted Programmable Logic Control outputs.
4. Provide control modules to perform the indicted input/output control functions. Module shall incorporate faceplates having membrane type pushbuttons, and LED's. All push-button and LED functions to be furnished with clear written identification. Control Modules to be provided with individual hand, off, auto push buttons and overload alarm, overload trip with LED and reset push buttons.

D. In addition, provide motor starter with the below listed features

1. Motor starters shall monitor current in each phase to provide phase loss and phase unbalance protection. Provide phase loss/unbalance protection which requires no time delay for reset.
2. Motor starters to provide Class II ground fault protection. Ground fault protection shall be set at 20% of maximum continuous ampere rating and have a start delay of 20 seconds, and a run delay of 1 second to prevent nuisance trip on starting.
3. All starters shall be complete with H-O-A (Hand-Off-Auto) selector switch.
4. All starters shall have a green "Stop" and a red "Run" pilot light.
5. All starters shall have automatic re-start after a power disturbance (power failure, blown-out, phase failure, etc.)

E. Single Phase AC Fractional Horsepower Manual Starters - 1HP or Less FHP manual starters shall be Cutler Hammer AN16 or Allen Bradley Bulletin 600. The manual starters shall consist of a hand-off-auto switch equipped with Bimetallic ambient compensated overload relays adjustable + 24%.

1. Thermal unit shall be of one-piece construction and interchangeable. The starter shall be inoperative if thermal unit is removed. Contacts shall be double break, silver alloy visible from both sides of starter.
2. All Fractional Horse Power Manual Starters shall be double-pole type with one (1) thermal overload relay and red pilot light.

F. Single and Three Phase AC Microprocessor-Based Starter (All Motors Between 1 HP and 10 HP)

1. Motor starters shall be rated in accordance with NEMA sized and horsepower ratings. No starter shall be listed as a ½-size. Motor starters shall be used in discrete control, in motor control centers, and in other user and OEM custom control panels. (IEC contactors are not acceptable).
2. Contacts shall be silver alloy, double break, and shall be inspectible on NEMA Sizes 00 through 4 without use of tools. Size 5 and larger shall be inspectible with standard tools. They shall be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.
3. Coils shall be the encapsulated type, and shall be replaceable on NEMA Sizes 00 through 4 without the use of tools. Size 5 and larger shall be replaceable with standard tools. They should be replaceable without removing the line, load, or control wiring from the starter, and replaceable without removing the starter from the enclosure.
4. Overload protection shall be provided by solid state electronic overload relay. Single-phase starters shall provide one-or two-leg overload protection; Three-phase starters shall provide three-leg overload protection.
5. Furnish Motor Starter with Solid-State Overload Relay Installed. GE Type 300-Line Enclosed Non-combination Starters, with Solid-State Overload Relay, Housed in Type 1 or 3R NEMA enclosure. Allan Bradley Type No. 509 or prior approved equivalent.
6. Electrical characteristics shall be as indicated in drawings.
7. Applications (Typical) Direct or Belted to motor equipment and components, fans/blowers, pumps compressors and etc.
8. Starter shall be full voltage non-reversing consisting of one contactor and one overload relay assembled together and provided with
   a. Hand-Off-Auto selector switch

b. Red on Light;
c. NC auxiliary contact;
d. Terminal Strips
e. Phase loss and phase unbalance relay

9. Starter shall be suitable for straight through wiring, with separate provision for control power connections at the L.1 and L.2 terminals
10. Starter shall have a NEMA solid state electronic overload relay and provide the user with following selectable settings.
    a. Selectable Class 10, 20 and 30, protection.
    b. Visible trip indicator with manual reset.
    c. Built in thermal memory to prevent hot motor restarts.
    d. Relay shall be capable of monitoring for motor single phasing with adjustable current unbalance of 20 to 50 percent, and incorporating a signal to an external device.
    e. Shall have a reset mechanism that resets on the upstroke only.
11. Protection Functions
    a. 21 Adjustable full load amps with tactile feed back dial.
    b. Protection against complete phase current loss.
    c. Accuracy plus or minus 2%.
    d. Repeatability plus or minus 2%.
    e. Self-powered @ 50 % of maximum current range.
    f. Size 1-6 (0.40A-50A, 600 V. 50/60 Hz).
    g. Unbalance trip signal for PLC operation
    h. Manual trip.
    i. Built-in line/load straps.
    j. Adjustable trip adjustment – Plus or minus 10%. By turning a dial in the overload relay face.
    k. Be ambient insensitive within an operating temperature range to minus 20 to plus 70 degrees Celsius.
    l. Relative humidity 95 percent non-condensing.
12. Options
    a. Control power transformer fusing shall be provide by two primary fuses plus on secondary fuse. Control power transformer secondary voltage shall be 120 VAC.
13. Auxiliary Contacts
    a. Contactor to be designed to accommodate two (2) auxiliary contact blocks, each capable of a combination of up to four (4) normally closed (NC) or four (4) normally open (NO) auxiliary contacts.
    b. Provide and install a minimum of one (1) spare NO contact and one (1) spare NC contact in addition to any auxiliary contacts specified or required for the proper operation of the temperature controls system.

G. Reduced Voltage AC Solid State Starters - (All Motors 10 H.P. and Above) All starters for motors 10 H.P. and above shall be a Cutler Hammer Type EA or Allen Bradley.

1. The controller shall be supplied for use on an electrical system as indicated on drawings.

The Reduced Voltage Starter shall be sized to control horsepower, as indicated on drawings.

2. The solid-state reduced voltage starter shall be UL and CUL listed and consist of an SCR based power section, logic board and paralleling bypass contactor.
3. The SCR based power section shall consist of six (6) back-to-back SCR's and shall be rated for a minimum peak inverse voltage rating of 1500 PIV. Units using triacs or SCR/diode combinations shall not be acceptable.

4. The logic board shall be mounted for ease of testing, service and replacement. It shall have quick disconnect plug-in connectors for current transformer inputs, line and load voltage inputs and SCR gate firing output circuits.
5. The paralleling bypass contactor shall energize when the motor reaches full speed and close/open under 1X motor current. The bypass contactor shall be equal to Cutler Hammer W200.
6. The following logic board adjustments are required
   a. Ramp Time; 1-45 seconds, on hexadecimal switch
   b. Current limit; 75- 500% current, on hexadecimal switch
   c. FLA of motor; 4-1 range of starter, on (Dip switch)
7. Maximum continuous operation shall be at 115% of continuous amp rating.
8. Refer to description of microprocessor starters for details regarding contactors and starters internal to this device.

END OF SECTION 23 05 13

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Related Sections:

1. General requirements for testing agencies are specified in the Division-1 Section Quality Control Services.
2. Other Division -23 Sections specify balancing devices and their installation, and materials and installations of mechanical systems.
3. Individual Division-23 system sections specify leak testing requirements and procedures.

1.2 SUMMARY

A. This Section specifies the requirements and procedures total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Test, adjust, and balance the following mechanical systems:

1. Supply air systems, all pressure range;
2. Return air systems;
3. Exhaust air and outside air systems;
4. VAV Boxes;
5. Chiller;
6. Kitchen Hoods and Ventilation Systems;
7. Pumps;
8. Verify temperature control system operation;
9. Air Distribution Devices;
10. All Cooling and Heating Coils;
11. Boilers;
12. Water Heaters
13. Fire and Smoke Damper (Witness Contactor Testing)

C. Provide assistance to Mechanical/Electrical Contractor and project Architect in system commissioning process. Identify all system variances of greater than 5% and make required measurements, adjustments, etc. to bring systems into compliance to satisfaction of project Architect.

1.3 DEFINITIONS

A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
1. The balance of air distribution;
2. Adjustment of total system to provide design quantities;
3. Electrical measurement;
4. Verification of performance of all equipment and automatic controls;

B. Test: To determine quantitative performance of equipment.

C. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment (e.g., reduce fan speed, throttling).

D. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

E. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

F. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required future testing, adjusting, and balancing.

G. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply inlets on water terminals, supply outlets on air terminals, return outlets on water terminals, and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

H. Main: Duct or pipe containing the system's major or entire fluid flow.

I. Submain: Duct or pipe containing part of the systems' capacity and serving two or more branch mains.

J. Branch main: Duct or pipe serving two or more terminals.

K. Branch: Duct or pipe serving a single terminal.

1.4 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1 and Section 230020.

E. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC are proposed.

F. Sample Forms: Submit sample forms, if other than those standard forms prepared by the NEBB are proposed.

G. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.
2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
4. General Information and Summary
    a. Air Systems
    b. Hydronic Systems
    c. Temperature Control Systems
    d. Special Systems
5. Report Contents: Provide the following minimum information, forms and data:
    a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
    b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC and NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

H. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

I. At the front of the Report, the TAB Contractor shall provide a summary sheet identifying system operational variances problems, etc. recommended corrective measures that in the opinion of the TAB Contractor should be enacted by the Mechanical Contractor prior to retesting. Submit to project Architect as work progresses with resolution documented for inclusion in final report.

1.5 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: A Professional Engineer (either on the installer's staff or an independent consultant), registered in the State in which the services are to be performed, and having testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. TAB Contractor shall be listed on La. State Facility Planning and Contorol approved TAB Contractor list.

C. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by NEBB as a Test and Balance Engineer.

D. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
2. An independent testing, adjusting, and balancing agency certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project, and having at least one Professional Engineer registered in the State in which the services are to be performed, certified by AABC as a Test and Balance Engineer.

E. Codes and Standards:

1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
2. AABC: "National Standards For Total System Balance".
3. ASHRAE: ASHRAE Handbook, 1984 Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.

F. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Architect and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting, and balancing.

1.6 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

1.7 SEQUENCING AND SCHEDULING

A. Test, adjust and balance air conditioning systems during summer season and heating systems during winter season, including at least a period of operation at outside conditions within 5 deg F wet bulb temperature of maximum summer design condition, and within 10 deg Fdry bulb temperature of minimum winter design condition. Take final temperature readings during seasonal operation.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation.
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chilled water heat exchangers to design requirements.
11. Lubricate all motors and bearings.
12. Test all fans.
13. Test sequencing of all motorized dampers, smoke dampers, etc.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

B. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

C. Patch insulation, ductwork, and housings, using materials identical to those removed.

D. Seal ducts and piping, and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

C. Prepare a summary sheet of noted variances in excess of + 5% of design value. Include all such variances, recommended resolutions and ultimate result in Appendix “A” to TAB Final Report.

3.6 DEMONSTRATION

A. Training:

1. Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1 and 23 0020.
2. Schedule training with Owner through the Architect with at least 7 days prior notice.

END OF SECTION 23 05 93

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Duct insulation installation shall not begin until all joints are sealed with mastic and all work has been tested and found to be tight.

PART 2 - MATERIALS

2.1 THERMAL INSULATION

A. After all work has been tested and found to be tight, insulate as follows:

B. Wrap all rigid supply ductwork, exhaust ductwork, return ductwork, and fresh air ductwork with flexible Fiberglass insulation with aluminum foil facing, as follows: 2-1/8" thick, 3/4 # density, R-6, sealing all joints w/ 2" wide vapor barrier tape. An additional band or tape shall be applied between the circumferential joints for a maximum two feet spacing of taped bands.

C. Insulate all refrigerant suction lines, with 3/4" Armstrong "Armaflex" Insulation or equal. On all lines exposed to weather or exterior conditions, provide two coats of mastic caulking over entire assembly. Mastic shall be Virginia foam mastic or equal.

D. Condensate drain lines shall be insulated with 3/4" Armstrong "Armaflex" Insulation or equal.

E. Furnish and install over entire areas of walls of air handling rooms containing a/c units a 1" thick Manville Linacoustic or equal acoustical type duct insulation 3# density, applied over Slick-Klips 12" on center. Stick-Klips shall be applied to wall with Miracle Adhesive. Acoustical material shall be applied over Stick-Klips with duct liner adhesive tape EC-104 spotted between pins. Stick-Klips with factor applied adhesive will not be acceptable.

F. HVAC flex-connections shall be wrapped on outside with 2-1/8" thick 3/4 # density fiberglass insulation with aluminum foil vapor barrier. Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

G. Duct mounted heaters shall be wrapped on outside with 2-1/8" thick 3/4 # density fiberglass insulation with aluminum foil barrier. Insulation shall be taped at all joints and installed per the manufacturer's recommendations.

END OF SECTION 23 07 00

SECTION 230900 - TEMPERATURE CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install as hereinafter specified, a complete system of electronic temperature controls. This control system shall be as manufactured by Trane. This system shall be installed and adjusted by mechanics regularly employed by the mechanical contractor. All equipment shall be of the manufacturer's first quality and shall be of full proportioning type.

B. All temperature controls and instrumentation covered by this specification shall be manufactured, installed and supervised by the same manufacturer in order to consolidate the responsibility of this system to one manufacturer. The control system shall consist of all thermostats, central control panel and other necessary equipment to provide controls of the following:

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new and delivered to the jobsite in the manufacturer's original shipping package. Used or otherwise second class material shall not be acceptable.

2.2 THERMOSTATS

A. Split System A/C unit thermostats shall be a 7-day programmable thermostat or approved equal. Thermostat shall be AUTOMATIC CHANGEOVER multistaged heating and cooling type and shall contain ON-OFF-AUTO switches for fan control and shall also contain HEAT-COOL switch for selection of mode of operation. Provide emergency auxiliary heat switch.

2.3 TEMPERATURE CONTROL WIRING INTERLOCK

A. The control sub-contractor shall make complete and coordinated interlock wiring and supervisory central system wiring diagrams. This sub-contractor shall obtain necessary diagrams from the successful manufacturer and shall completely coordinated the interlock diagram.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Mechanical Contractor shall coordinate with the Electrical Contractor and shall provide all motor starters, etc., required for the completion of the electrical work.

B. All control wiring 24V or 120V shall be provided by the Mechanical Contractor. Coordinate with electrical contractor.

C. All wiring required in the control systems, including electrical connections for the thermostats, firestats, smoke detectors, exhaust fans and all interlocking motor control wiring shall be furnished and installed by Mechanical Contractor.

D. All wiring shall be in conduit and in accordance with the National Electrical Code (N.E.C.).

E. All control wiring located outdoors shall be installed in rigid or intermediate metal conduit.

F. All control wiring located indoors where an accessible ceiling is not available shall be installed in E.M.T. conduit.

G. All control wiring located above accessible ceilings shall be N.E.C. approved cable. All control wiring located above accessible ceilings used as air plenums shall be N.E.C. approved "plenum cable".

H. All conductors shall be copper. Conductors used for power circuits shall be #12 TW minimum. Conductors used for control circuits shall be #14 TW minimum. Conductors used for sensor circuits shall be #18 TW minimum.

3.2 FLOAT SWITCH:

A. Provide float switch to emergency drain pan of each AHU. Switch shall be interlocked with AHU to de-energize the unit when the water level in the pan rises above a set level.

3.3 MOTORIZED DAMPERS:

A. O.A. motorized dampers shall be interlocked with A/C units in respective mechanical rooms to open when any A/C unit is "on" and closed when all A/C units are "off". Provide all necessary relays, switches, transformers, etc. as required.

B. Motorized dampers shall be furnished and set in place by contractor installing the ductwork.

C. Damper actuators shall be 120/1/60 electric actuators specifically selected for damper manufacturer's requirements. Controls contractor shall furnish and install actuators. Coordinate all work with contractor installing dampers.

3.4 SEQUENCE OF CONTROLS

A. Split Systems

1. Supply fan start/stop: The supply fans will be started according to the schedule. After the supply fan has been started, the control sequence will be enabled. Outside air damper will open/close in conjunction with fan start/stop.
2. Zone control: Modulate/cycle dx cooling to maintain the zone temperature at setpoint.
3. Night setback/night setup: When in “unoccupied” mode, the unit will cycle as necessary to maintain the night setback zone temperature at setpoint. A differential prevents the unit from cycling excessively.

4. SHUTDOWN:

a. When the unit is shutdown by either a stop command or system safety the unit will be set as follows:

(i) Supply fan will be off
(ii) DX cooling will be off
(iii) Fresh air damper will close.

B. Pants Leg Split System Units:

1. Provide one 7-day programmable thermostat for both A/C units “6A” & “6B” with two stages of cooling and 4-stages heating. When the thermostat calls for cooling, both "6A" & "6B" supply fans shall start, both compressors for A/C "6A" shall start, the motorized outside air damper for A/C "6A" shall open, the motorized outside air damper for A/C "6B" shall remain shut. If the temperature setpoint cannot be maintained, both compressors for A/C "6B" shall start in parallel with compressors for A/C "6A", the motorized outside air damper for A/C "6B" shall open. When temperature setpoint is achieved, the system shall cycle off and both motorized outside air dampers shall shut.

2. For heating mode the same sequence shall occur with the heat strips in lieu of the compressors.

3. If return air CO2 level remains below 1000 ppm (adjustable), the motorized outside air damper for A/C "6B" shall be disabled and shall remain in the shut position.

4. Provide any controls, wiring, relays, programming, etc. as required to achieve the above sequence.

C. Exhaust Fans:

1. Provide occupancy sensors to control exhaust fans.

END OF SECTION 23 09 00

SECTION 23 30 00 - AIR DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install all ducts for Air Conditioning, Heating and Ventilating System as shown on the plans and as may be required to provide complete system. Ductwork shall be complete with grilles, vanes, flashings, hangers, flexible connections, splitters, dampers, fresh air inlets, louvers, reinforcing angles, etc. All ductwork shall be concealed and insulated as hereinafter specified. All ductwork indicated on drawings shall be metal-to-metal outside dimensions.

PART 2 - PRODUCTS

2.1 DUCT HANGERS AND SUPPORTS

A. All ductwork shall be properly braced to prevent rattling, breathing or other unnecessary noise. No sharp edges or obstructions shall project into the air stream. (1" wide x 16 gauge minimum)

2.2 LOW PRESSURE DUCTWORK

A. All ductwork for constant air units shall be galvanized steel and shall be of gauges and construction as recommended by ASHRAE Guide and Data Book. Gauges are as follows, with longest side governing.

1.

Dimensions of longest side	Sheet Metal Gauge
0"-12"	26 Gauge
13"-30"	24 Gauge
31"-54"	22 Gauge
55"-84"	20 Gauge

B. Joints and reinforcing shall be as per ASHRAE Guide and Data Book and all slips shall be installed without edge of internal part of slip facing downstream.

C. All joints shall be sealed with hard cast FTA adhesive and hardcast DT 5300 tape.

D. Construction standards of Article 110 of the National Board of Fire Underwriters, Bulletin 90, latest edition, shall apply throughout.

E. Flashings shall be sheet copper, and shall be furnished and installed around all outside openings used for ducts of fans and wherever required. Roof flashings shall extend at least 8" above roof.

F. All ducts shall be straight and true and installed in a neat and workmanlike manner.

G. All edges shall be straight and true, and all bends shall be made with vaned turns. Where long radius turns cannot be used, the Contractor shall use square turns and use air splitters spaced not more than 3" center to center, and of a length so air will be properly distributed over the ducts.

2.3 SPIRAL DUCTWORK

A. All exposed ductwork and fittings in the PTEC Lab shall be 2" double wall, insulated spiral lock-seam ductwork with perforated liner and paint grip finish for painting by the painting contractor. Double wall, spiral lock-seam ductwork with perforated liner shall be United McGill ACOUSTI-k27 or approved equal. Sizes shown on plans are inner dimensions.

2.4 ROUND DUCTWORK

A. Shall be constructed of 26 gauge galvanized sheet metal with screwed and taped joints or snap lock joints.

B. At contractor's option, pre-insulated flexible ductwork (R-6) as manufactured by Thermaflex Model MKE, Flexmaster 8M or prior approved equal may be used to connect to ceiling diffusers (maximum 6'-0" length). Quietflex Series 80 and Thermaflex Model KM are not approved.

C. Flexible duct shall be maximum 4' in length, properly installed tight and straight with hangers and no sagging or kinks. Provide hard round snap lock duct wrapped with insulation for all runs greater than 6' in length. Any flexible duct runs 6' or less shall only be used for straight runs. Any turns shall have hard round elbows at spin in fittings prior to running flexible duct.

D. Insulated Acoustical Low Pressure Flexible Duct Specification:

1. The duct shall be constructed of a CPE fabric supported by helical wound galvanized steel. UL181 Class I Air Duct. Fabric shall be mechanically locked to the steel helix without the use of adhesives or chemicals. The internal working pressure rating shall be at least 6" w.g. positive and 4" w.g. negative with a bursting pressure of at least 2½ time the working pressure. The duct shall be rated for a velocity of at least 4000 feet per minute. The duct must be suitable for continuous operation at a temperature range of -20° F to +250° F. Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 6.0 at a mean temperature of 75° F. (R-4.2 is not acceptable) Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A. All flex connections to ceiling diffusers must be connected with an insulated square to round box.

2.5 DUCTWORK SEALANT

A. All ductwork shall be air tight. All seams, both shop made and field installed, and shall be sealed with tape and glue. All transverse joints shall be sealed as well as spin collar takeoffs and rough duct connections. All duct connections and seams shall be sealed with a UL approved non-flammable tape and mastic system. Strict adherence to manufacturers installation instruction is required. The duct sealant shall be equal to Hardcast FTA20/DT5300, United McGill Unit-Sealer Tape and Glue or 3M Company Sealing System.

2.6 DUCT ACCESSORIES

A. Dampers of the fusible link operated type shall be provided in all ductwork passing through the floor or firewalls. In all cases, the time rating of damper shall be equal to or greater than the time rating of the wall.

B. Provide quadrant or adjustable splitters and mark shaft to give position of splitter damper in duct.

C. Provide vanes behind every supply grille or diffuser. Splitters shall be provided where shown on Plans and where located in concealed, non-accessible space, provide Young Regulators to operate splitter. Vanes shall be Tuttle and Bailey "Ducturns", Barber Coleman Uniflo or equivalent. Shop fabricated vanes will be acceptable. All dampers shall be constructed of 14 gauge steel.

2.7 REGISTERS, GRILLES AND DIFFUSERS

A. Square or rectangular ceiling supply outlets, unless noted otherwise, shall be Anemostat, Metalaire, Price, Titus or equal, as indicated in schedules. Color shall be white. Grilles shall be of aluminum construction with baked enamel finish. Where noted on plans, grilles with the fire dampers in ceiling shall be steel construction with fire rated blanket behind grille as required by grille type scheduled.

B. All wall supply grilles shall be complete with horizontal and vertical adjustable deflectors and opposed blade volume control damper. Grilles shall be manufactured by Titus, Anemostat, Metalaire, Price or prior approved equivalent.

C. Return air grilles shall be as manufactured by Anemostat, Metalaire, Titus, Price or equivalent, and shall be of the style called for on the Plans. Provide filters in filter back grilles.

D. All supply outlets shall have a sponge rubber gasket.

E. "Stamped" grilles and diffusers are not approved.

F. Unless otherwise shown on Drawings, all grilles installed in walls and doors shall be furnished with prime coat finish suitable for painting by painting sub-contractor.

2.8 MOTORIZED DAMPERS

A. Mechanical Contractor shall furnish and install motorized dampers at outdoor intakes as indicated on mechanical and architectural drawings. Damper shall be parallel blade motorized type equivalent to Ruskin CD36/PB, Arrow Series 1770, or equal. Motorized dampers shall be operated by 120/1/60 electric actuator as indicated on plans. Damper shall be complete with outboard support bearing, blade and jamb seals. Dampers shall be low - leakage type.

2.9 FILTERS

A. Unless noted otherwise, AHU filter media shall be 1" thick and of the non-woven cotton fabric type. The filter media shall have an average efficiency of 25-30% on ASHRAE Test Standard 52-76. It shall have an average arrestance of 90-92% in accordance with that test standard. Media support grid shall be a welded wire grid with an effective open area not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility air bypass. Filters shall be Farr 30/30 or A.A.F. AM 300.

B. Provide one (1) set of filters for start-up and replace with new set after building is turned over to owner.

C. Provide one (1) additional set of filters for every piece of equipment to owner for stock.

2.10 DUCT ACCESS PANELS

A. Access panel shall be Flexmaster "Inspector Series" Model SDSM low leakage spin-in access door. Door shall be 1" insulated type and shall be 24 gauge steel with 24 gauge steel frame. A continuous 3/8" wide by 3/16" thick open cell adhesive neoprene gasket shall be installed in the door frame to provide a positive seal upon insertion and locking of door. The door shall be held secure with every spaced cast aluminum cam latches for even pressure against the gasket.

2.11 MANUAL DAMPERS

A. Mechanical contractor shall furnish and install manual dampers at outdoor air intakes and in other rectangular ductwork as indicated on plans. Damper shall be complete with outboard support bearing, and manual locking quadrant lever for balancing, blade and jamb seals.

B. Manual balancing dampers meeting the following specifications shall be furnished and installed where shown on plans and/or as described in schedules. Dampers shall consist of: a 16 ga galvanized steel hat channel frame with 5 in depth; triple V type blades fabricated from 16 ga galvanized steel; 0.5 india. plated steel axles; external (out of the airstream) blade-to-blade linkage. Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval showing damper suitable for pressures to 4 in wg, velocities to 2,000 ft/min and temperatures to 180 F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck's Model MBD-15, Nailor 1022, Ruskin MBD-35.

C. Manual balancing damper and motorized damper sizes shall be 6" in height. Transition 4" high fresh air ductwork to standard manual and motorized damper sizes.

2.12 SPIN COLLARS:

A. All round low pressure connections to rectangular ducts shall be made with a factory fabricated spin collar fitting with damper and constructed of minimum 26 ga galvanized steel. The damper shall have a 2" raised handle with a high quality locking quadrant. A 3/8" continuous rod with "U" bolts connects the damper to the rod. Nylon end bearings are required where the rod penetrates the spin collar barrel. Provide Dace #SM-7 SPININ-W/SOLQ-CR, Flexmaster #FLD-B03, or prior approved equal. A sample must be submitted for engineer's approval prior to installation.

2.13 FIRE DAMPERS

A. Furnish and install, at locations shown on Plans, fire dampers constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have fire protection label in accordance with established UL labeling procedures. Damper manufacturer's literature submitted for approval prior to installation shall include comprehensive performance data developed from testing in accordance with AMCA Standard 500, and shall illustrate pressure drops for all sizes of dampers required at all anticipated air flow rates. Fire dampers shall be equipped for vertical or horizontal installation as required by the location shown.

B. Fire dampers shall be 100% free area and installed in wall openings utilizing steel sleeves, angles or other materials and practices required to provide an installation equivalent to that utilized by the manufacturer when dampers are tested by UL. Installation shall be in accordance with the damper manufacturer's instructions. Fire dampers shall be Ruskin Type DIBD, Style B, Air Balance or approved equivalent

PART 3 - EXECUTION

3.1 INSTALLATION

A. All installations shall comply with SMACNA standards, or ASHRAE standards whichever is more stringent for the type if installation being performed.

B. Coordinate with other trades as required to assure proper and adequate provisions in the work of those trades for interface with the work of this section.

C. NOTE: Prior to fabrication and installation of ductwork, contractor shall coordinated the location of all ducts and ductwork with structural shop drawings and shall make any and all deviations necessary to accommodate ductwork to structural conditions. Contractor shall verify all locations, routing, installation, and sizes with existing conditions on job site prior to fabricating or installing ductwork. Notify architect of any changes required for proper coordination between trades.

END OF SECTION 23 30 00

SECTION 23 80 00 - HVAC EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Air Conditioning System, in general, shall be for the entire building providing cooling and dehumidification in summer and heating in winter. A constant amount of fresh air shall be taken into the system and all air shall be filtered.

1.2 SCOPE OF WORK

A. This section calls for furnishing all labor and materials necessary to provide and install the complete air conditioning, heating and ventilating system. It is the intention of these specifications that the mechanical system shall be furnished complete with all necessary valves, controls, insulation, piping, devices, equipment, etc. necessary to provide a satisfactory installation in working order.

B. All ductwork and piping shall be concealed and insulated as hereinafter specified unless noted otherwise.

C. Provide a temperature control system.

PART 2 - PRODUCTS

2.1 HIGH EFFICIENCY DX SPLIT AIR COOLED CONDENSING UNIT- OUTDOOR SECTION

A. Furnish and install high-efficiency, air-cooled top discharge condensing unit where shown and with capacities scheduled. UNIT SHALL BE COMPLETELY FACTORY ASSEMBLED, PRE-CHARGED AND TESTED, AND SHALL BE SUPPLIED FROM THE FACTORY WITH ALL FEATURES LISTED BELOW.

B. Condenser coil shall be constructed of aluminum fins mechanically bonded to an aluminum coil and shall be protected with stamped louvered panels on outside of unit.

C. Condenser fan shall be propeller type, direct driven. Motor shall have inherent protection and be of the permanently lubricated type, resiliently mounted. Fans shall be complete with safety guards.

D. Compressor shall be a single speed serviceable hermetic or sealed hermetic design complete with crankcase heater and external spring isolators and compressors, and shall have a 5-year warranty. Unit shall be equipped with time delay to prevent compressor from starting within five minutes of "off" time.

E. All controls shall be factory wired and shall consist of condenser fan overload devices, hard start kit (single phase only), internal pressure relief valve, filter dryers, pressure taps for refrigerant check, quick connect refrigerant couplings and liquid and suction line service valves. Unit shall also be furnished with outdoor expansion valve or metering valve and check valve, switch-over valve, time and temperature defrost control system, "thermister" outdoor temperature sensor and an evaporator defrost control kit to permit the cooling system to operate down to 30oF outdoor temperature.

F. Casing shall be fully weatherproof for outdoor installation and shall be bonderized steel with baked enamel finish. Panels shall be removable to provide access for servicing. Unit shall be set in place on rubber mounting pads.

G. Contractor shall advise the Electrical Contractor of the manufacturer's recommended fuse size if different from that specified on the Electrical Drawings. Mechanical Contractor shall pay any additional costs required to change fuse sizes.

H. Unit shall be as manufactured by Trane, Carrier, York (JCI), Lennox, or approved equivalent.

2.2 HIGH EFFICIENCY DX SPLIT AIR HANDLING UNIT- INDOOR SECTION

A. Furnish and install vertical discharge/bottom return, or horizontal type (as indicated on plans) air conditioning unit of size, type and capacities as scheduled. Units shall be Trane, Carrier, York (JCI), Lennox or approved equivalent.

B. Units shall be complete with fan, multi-speed direct drive blower, motor, direct expansion cooling coil, low voltage control transformer, grease fittings, drain pan, etc. All units shall be factory insulated on the interior with not less than 3/4# density neoprene coated fiberglass cemented in place with waterproof adhesive.

C. Each unit shall be mounted on a suitable base as indicated on plans or 18" (minimum) high painted angle iron base approved by the Engineer to allow for proper return air. Unit shall also be designed for continuous operation at the maximum rated static pressure. Fan capacities shall be rated with the fans in the units, and the horsepowers specified shall include all losses.

D. Casings shall be suitable for operation at the pressures specified and constructed of bonderized steel.

E. Cooling coils shall be of aluminum or copper and shall be tested at 400 psi air pressure. Cooling coil face velocity shall not exceed that guaranteed by manufacturer for no moisture carry-over.

F. Electric strip heaters shall be as hereinafter specified and shall be mounted inside unit housing. Coordinate electric service to heaters and blower with Electrical Contractor. Heater and air unit shall be internally wired and fused to receive one electrical source of power.

G. Filter shall be 1" thick, pleated, throw-way mounted in an accessible factory filter rack at unit.

H. Contractor shall provide a new set of filters upon completion of project, to turn building over to Owner.

I. If the manufacturer's equipment is not available internally wired to receive one source of power, necessary modifications to electric service shall be the responsibility of the equipment supplier. Any modifications required shall be submitted in writing ten (10) days prior to the bid date.

2.3 DUCTLESS SPLIT SYSTEM

A. The Heat Pump system shall be a Mitsubishi Electric split system (or approved equal) with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a hard-wired wall-mounted thermostat. Install per manufacturer's installation instructions. Provide factory condensate pump.

B. The units shall have a manufacturer's parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer.

2.4 ELECTRIC STRIP HEATERS

A. Electric strip heaters shall consist of open coils made from Grade "A" resistant wire insulated by floating ceramic bushings and supported in an aluminum steel frame.

B. All terminal studs, nuts and washers shall be stainless steel, insulated with phenolic terminal bushings. Terminals shall be machine crimped to coils and heater shall be tested at 2000 volts before shipment. All voltages and phases shall be as scheduled.

C. Heater shall be provided with built-in contactors, with one terminal block furnished for each circuit and separate contactors for each stage of heating. Heaters with air units supplying 2000 CFM or less shall be internally wired with air unit to receive one electric source of power.

D. An automatic reset thermal cut-off shall be provided to break the heater load directly on over-temperature. In addition, provide manual reset thermal cut-off to break the heater load manually.

E. Control circuit transformer shall be built into heater terminal box and sized to carry full contactor holding coil load.

F. Heaters shall be listed by UL and shall be as manufactured by Chromalox, Electric Heaters, Inc., Industrial Engineering and Equipment Co., or an approved equivalent.

G. Heater shall be equipped with built-in pressure type air flow switch. Heater shall be mounted inside unit housing.

H. Where indicated on drawings, heaters in ductwork shall be provided with duct flanges. Outside of heater shall be wrapped with 2.33" thick fiberglass ductwrap with aluminum foil vapor barrier.

2.5 LABELING A/C UNITS:

A. All indoor and outdoor a/c units shall be labeled with permanent laminated plate riveted to unit. Units shall be labeled as indicated in schedules. Plate shall be black with white unit numbers. Height of unit number shall be minimum of one (1) inch. Label shall also indicate area serviced by unit as noted in schedules. Height of letters shall be minimum of one-half (½) inch. Submit sample to Engineer for approval.

2.6 EMERGENCY DRAIN PAN (DX Equipment)

A. Provide angle iron frame for A/C units as shown on plans. Allow proper clearance for R.A. duct connection and removal of filters, etc.

B. Drain pans shall be constructed of 20 gauge galvanized metal. Pan shall extend 4" beyond the edge of the unit. The sides of the pan shall be 4" high with drain connection located inside of the pan.

C. Provide 3/4" Type "L" hard copper drain line with valve and pipe to floor drain in mechanical room.

2.7 VENTILATING SYSTEM

A. This contractor shall furnish and install all exhaust fans shown and scheduled on plans. Fans shall be of type indicated and shall be Acme, Cook, Greenheck, or approved equal. All belt driven fans shall have adjustable pitch sheaves and adjustable motor bases. Maximum sones shall be as scheduled.

B. All fans shall bear AMCA certified ratings and seal. Fan performances shall be rated according to AMCA standards 210 and standard 300. For belt driven models BHP shall include belt drive losses.

C. All exhaust fans shall be equipped with bird screen, wall collars and automatic back draft dampers unless noted otherwise.

D. Fan motors shall be of the 40 degrees C ambient temperature rise type and shall be suitable for continuous duty operation.

E. Fresh air intakes shall be of the same type and style as exhaust fans and of the size indicated on plans.

F. Aluminum bird screens shall be provided with fresh air intakes.

2.8 LABELING

A. Contractor shall provide phenolic plastic unit identification numbers at each indoor and outdoor A/C unit. Numbers shall be as detailed on plans. Identification shall have black background and white numbers and shall indicate respective A/C equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All A/C installations shall comply with manufacturer's recommendations.

3.2 INSTALLATION OF EQUIPMENT

A. Install all equipment where indicated on drawings, in accordance with equipment manufacturer’s published installation instructions, and with recognized industry practices, to ensure equipment comply with other trades as necessary to insure the equipment is installed and interfaced with other associated equipment to insure a complete installation and the equipment operates properly and serves its intended purposes.

B. Provide access to equipment for servicing as for the published manufacturers installation drawing and instruction and as per accepted trade practices dictate.

C. Install electrical devices furnished by the manufacturer but not specified to be factory mounted. Furnish copy of manufacturer’s submittal and installation requirements of Division 16 section. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

D. Piping connections are to be according to Division 15. Provide piping, valves, accessories, gauges, supports, and flexible connector as indicated on drawings and equipment manufacturers submittals if applicable.

E. All connections i.e., duct connections are to be per Division 15 and equipment manufacturer’s submittals. Provide all necessary accessories to make connection complete as per acceptable trade practices.

F. Provide positive equipment ground for all installed equipment as per equipment manufacturer’s specifications.

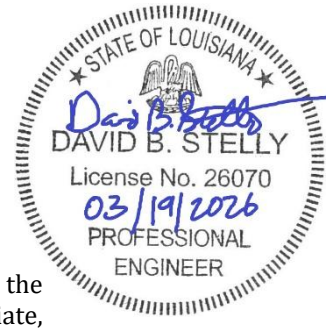
3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of equipment start-up operate equipment to demonstrate capability and compliance with requirements. Field correct malfunctioning equipment and retest to demonstrate compliance.

3.4 INSPECTION

A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the installer. Under no circumstance is any equipment to be installed and operated under normal conditions without all necessary controls and safety shut off devices installed and working properly.

END OF SECTION 23 80 00



SECTION 26 00 01 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions as appropriate, apply to the Work specified in this Section.

B. Refer to all Electrical Divisions of the Specifications as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 BIDDING REQUIREMENTS AND RESPONSIBILITIES

A. Prime bidder is responsible for all work, of all trades and sub-contractors bidding this project. It is the prime bidder's responsibility, prior to submitting a bid to ensure that sub-contractors coordinate all aspects of the work between trades, sub-contractors, etc. to the fullest extent possible.

B. Prime bidder shall ensure that all sub-contractors, suppliers, equipment vendors, etc., obtain all necessary and pertinent contract document information pertaining to their work prior to the submission of a bid. Contractor shall realize that different sub-contractors may furnish equipment, accessories, devices, etc. necessary for a complete and working installation, that require provision of services by another sub-contractor or trade.

C. Bidders of all or any portions of this section or division are required to review all contract documents including but not limited to Architectural drawings, Structural drawings, Mechanical drawings, Plumbing drawings, Electrical drawings, etc. to coordinate requirements and responsibilities with and through prime bidder.

D. Bidders of all or any portions of this section or division, by furnishing a bid on a portion of the prime contract are indicating that they have received all contract documents and coordinated services provided under their portion of the work with the prime bidder; they are indicating that they have expressed any pertinent questions (which would result from a detailed, thorough review of the entire set of contract documents) to the prime bidder in accordance with the general provisions of the Specifications requirements, prior to bidding.

E. All timely, pertinent, questions provided in writing prior to bids, in accordance with the general provisions of the Specifications requirements, will be clarified, defined, or otherwise explained in a written addendum and/or addendums prior to bids, in accordance with the general provisions of the Specifications requirements.

F. It is not the intention of these contract documents to leave any issue relating to coordination between trades or sub-contractors vaguely defined. The intention is to define all issues, coordination matters, equipment requirements, sizes, routing, etc. to the satisfaction of the prime bidder, prior to receipt of bids.

G. Bidders of all or any portions of this section or division, by virtue of the submission of a bid to the prime bidder, are indicating that they have reviewed the entire set of contract documents with due diligence and regard for the Owner's desire for a comprehensive and complete bid proposal; that they have expressed all concerns or questions requiring clarification on matters

of coordination between trades and/or sub-contractors; that they have expressed any such concerns or questions in writing in accordance with contract document's General Provisions requirements.

H. Prime bidders, by submission of a comprehensive bid on the project are indicating that the subcontractors selected in their bid have complied with all contract document's General Provisions requirements, that they have indicated in writing, prior to bidding, all questions or concerns requiring clarification and/or explanation and have documented any and all specific exclusions involving work that would generally be considered to be work of their trade. The prime bidder shall coordinate all work so that anything excluded by the bidder of all or any portions of this section or division, have been addressed prior to bids in one of the following manners:

1. The work has been confirmed, by the prime bidder, to be work of another trade or subcontractor whose proposal is also being accepted.
2. Clarification of the matter has been made through the prime design professional via written addendum and is clearly and mutually understood by the prime bidder and the party raising the issue/question or seeking clarification.
3. The work has been accepted as the responsibility of the prime contractor directly.

1.3 MATERIAL AND EQUIPMENT

A. The term "provide" when used in the Contract Documents includes all items necessary for the proper execution and completion of the work.

B. Specific reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgement of the Architect expressed in writing is equivalent to that specified.

C. Coordinate and properly relate all work of this Division to building structure and work of all other trades.

D. Visit premises and become thoroughly familiar with existing conditions; verify all dimensions in field. Advise Architect of any discrepancies prior to Bid Date in accordance with contract document's General Provisions.

E. Do not rough-in for any item or equipment furnished by others or noted "Not in Contract" (NIC), without first receiving rough-in information or determining rough-in requirements from other trades and/or Architect.

F. Provide storage and protection for all equipment and materials in accordance with requirements of contract document's General Provisions. Replace any equipment and materials damaged by improper handling, storage, or protection, at no additional cost to the Owner.

G. Keep premises clean in accordance with requirements of contract document's General Provisions.

1.4 SUBSTITUTIONS

A. Substitutions are allowed under La. R.S. 38:2291 and La R.S. 38:2292. Any requests for prior approval (as provided for under La. R.S. 38:2295) including any re-submitted data, shall be received by the Architect/Engineer a minimum of ten (10) working days prior to bid date.

Submittals sent via facsimile and/or electronic mail will not be accepted. The Contractor shall recognize that it may be necessary to submit certain requests for prior approval sooner than the final date listed in the Instructions to Bidders, depending upon the complexity and completeness of the submittal. If, in the opinion of the Architect/Engineer, there is neither sufficient time available nor adequate descriptive data attached to the submittal, the submittal will not be considered. Except as otherwise specified, materials and equipment shall be new and bear the approval label of the Underwriters Laboratories, Inc. for the type of installation required.

B. Basis of design of systems is based on specific equipment for performance, size, shape, color, construction material, etc... If the use of other manufacturer's equipment, even though approved by Architect, involves additional cost due to space requirements, foundation requirements, increased mechanical or electrical services, the cost of such extra work shall be borne by the contractor. Even though a manufacturer's name appears in the Contract Documents as having acceptable equipment, his equipment shall be classified as being a substitute to the equipment originally designed for and named in the Contract Documents. Substitute equipment, materials, etc., will not be allowed to deviate from basis of design requirements.

C. All requests for prior approval shall identify where proposed material matches or exceeds the performance of the equipment specified. In addition, such submittal shall also clearly identify all deficiencies compared to specified product. Submittal of general cut sheets will be returned rejected.

D. The following items shall be submitted for prior approval:

1. Lighting Fixtures
2. Electrical Gear (Loadcenters, Panelboards, Transformers, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
3. Dimmer Switches
4. Fire Detection and Alarm System
5. Receptacles
6. Toggle Switches
7. Wiring Device Box Support Brackets
8. Tele/Data Systems
9. Cover Plates
10. Wire
11. Occupancy/Motion Sensors
12. Dimming Systems/Lighting Control Systems
13. Floor Boxes
14. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
15. Lighting Emergency Battery Packs

1.5 DRAWINGS AND SPECIFICATIONS

A. The specific intent of these Contract Documents is to provide the various systems, equipment, etc. to the Owner complete and in a thoroughly calibrated and functional condition.

B. The Drawings shall not be construed as shop drawings. In the event of a possible interference with piping or equipment of another trade, items requiring set grade and elevations shall have precedence over other items. Should any major interference develop, immediately notify the Architect.

C. In laying out Work, refer to mechanical, electrical, structural, and architectural drawings at all times in order to avoid interference and undue delays in the progress of the Work.

1.6 CODES AND REGULATIONS

A. Work shall be in full accord with the LA Sanitary Code, 2020 N.E.C. (NFPA 70), local ordinances, building codes, and other applicable national, state, and local regulations.

B. Equipment shall conform to requirements and recommendations of the National Bureau of Fire Underwriters and National Fire Protection Association (NFPA).

C. Items provided under this Division shall comply with the American National Standards Institute (ANSI) "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People," ANSI A 117.1, and the Americans with Disabilities Act (A.D.A.).

D. Work called for in these Plans and Specifications shall be executed by competent workmen.

E. In the possible event of conflict between codes or regulations and Contract Documents, notify the Architect/Engineer immediately.

F. The drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves the right to make reasonable changes in locations indicated, before roughing-in, without additional cost to the Owner.

G. Because of the small scale of the drawings, it is not possible to indicate all of the offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions at no additional costs to the Owner.

1.7 FEES, PERMITS, AND TAXES

A. Obtain and pay for permits required for the Work of this Division. Pay fees in connection therewith, including necessary inspection fees.

B. Pay any and all taxes levied for Work of this Division, including municipal and/or state sales tax where applicable.

1.8 MANUFACTURER'S DIRECTIONS

A. Install and operate equipment and material in strict accord with manufacturer's installation and operating instructions. The manufacturer's instructions shall become part of the Contract Documents and shall supplement Drawings and Specifications.

1.9 SUBMITTAL DATA

A. Submit shop drawings, project data, and samples in accordance with requirements of the General Provisions of the contract documents. Submittals shall be received no later than thirty (30) consecutive calendar days from effective date of “Notice to Proceed”.

B. Shop drawings shall consist of published ratings or capacity data, detailed construction drawings for fabricated items, wiring and control diagrams, performance curves, installation instructions, manufacturer's installation drawings, and other pertinent data. Submit drawings showing revisions to equipment layouts due to use of alternate or substitute equipment.

C. Where manufacturers and suppliers of equipment, materials, etc. are unable to fully comply with Contract Document basis of design requirements, specifically call such deviations to attention of Architect/Engineer on submittals. Typed deviations on a separate sheet; underlined statements or notations on standard brochures, equipment fly sheets, etc. will not be accepted. Submittals shall clearly indicate where material submitted meets and/or exceeds the performance criteria of the equipment used as the basis of design of the project. Failure to note compliance with the basis of design material/equipment shall result in rejection of submittals.

D. Approval of submittals shall not relieve Contractor from furnishing required quantities and verifying dimensions. In addition, approval shall not waive original intent of Contract Documents.

E. Failure to obtain written approval of equipment shall be considered sufficient grounds for rejection of said equipment regardless of the stage of completion of the project.

F. Contractor shall submit Submittals/Shop Drawings on all equipment listed below. In addition, contractor shall refer to subsequent sections of the Electrical portion of the specifications for additional shop drawing submittal requirements.

1. Lighting Fixtures
2. Electrical Gear (Loadcenters, Panelboards, Transformers, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
3. Dimmer Switches
4. Fire Detection and Alarm System
5. Receptacles
6. Toggle Switches
7. Wiring Device Box Support Brackets
8. Tele/Data Systems
9. Cover Plates
10. Wire
11. Occupancy/Motion Sensors
12. Dimming Systems/Lighting Control Systems
13. Floor Boxes
14. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
15. Lighting Emergency Battery Packs

G. Shop drawings may be submitted electronically as described below.

1. Must be in a portable document format (PDF).
2. Must be submitted to the prime designer and the prime designer will forward to ADG Engineering for distribution/processing.
3. Do not submit directly to ADG Engineering’s project manager.

H. Shop Drawings/submittals shall be submitted as grouped together and stated below and shall be submitted simultaneously. Electrical gear shop drawings shall not be submitted until approval is obtained for all HVAC and plumbing equipment. Prior to submission of electrical gear shop drawings, contractor shall obtain a copy of the approved mechanical and plumbing submittals. Any modifications required to be made to the electrical gear due to changes in

electrical requirements (increases and/or decreases) of the mechanical and plumbing equipment shall be clearly notated in the electrical gear submittals.

1. Light Fixtures, Occupancy/Motion Sensors, Dimming Systems/Lighting Control systems, Emergency Battery Packs
2. Electrical Gear, Overcurrent Protective Device Studies
3. Tele/Data Systems
4. Fire Detection and Alarm System
5. Dimmer Switches, Receptacles, Toggle Switches, Cover Plates, Device Box Support Brackets, Pull Boxes, Floor Boxes, and Wire
6. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)

1.10 PROJECT COORDINATION

A. Refer to applicable Electrical Specification Sections for products work of this Division.

B. Refer to all plumbing, mechanical and fire protections specifications sections for related products affecting work of these electrical sections.

C. Coordinate handling of all products, materials, etc., through the Contractor. Coordinate space, access, clearances, etc., through the Contractor prior to preparation of shop drawing submittal.

D. The Contractor is herein cautioned to note that the work involved is a complicated renovation and a new addition project requiring continuous owner occupancy. The Contractor should review the phasing plans/descriptions and visit the project site to determine existing conditions. The Contractor will be held responsible for allowing for these conditions in his bid.

1.11 SERVICE CONTINUITY

A. At all times during the construction of the project, electric service shall be maintained to all portions of the site and existing facility, except with prior written approval from the Architect/Engineer of interruptions. It shall be the responsibility of the contractor to provide, install and maintain (fuel included) any required rental generators to accomplish said task. Any required interruptions of electric service due to work being performed under this Contract shall be scheduled in writing a minimum of forty-eight (48) hours in advance after consultation with the Architect/Engineer and the Owner and shall occur when permitted by the Architect/Engineer. The Contractor shall be responsible for any overtime pay required to meet these requirements, at no additional cost to the Owner.

1.12 VALUE ENGINEERING (V/E):

A. While it may be in the Owner's interest to consider the first cost money saving that may be generated via alternatives and options generated via participation in Value Engineering, contractor shall realize that substantive offers of Value Engineering (V/E), if accepted by the Owner, constitute a design-build agreement (offer and acceptance) with the owner, and drastically change the design concept of the project, as developed by the Professional of Record identified on the Contract Documents.

B. Should contractor offer, and the owner accept value engineering options that alter aspects of the system design, equipment, performance and/or performance verification or monitoring of respective systems, the contractor shall provide duly licensed professional engineering consultants working on behalf of the contractor (including sub-contractors and equipment vendors/manufacturers) to review, approve and take professional responsibility for

performance and suitability of V/E hybrid systems, materials or operational changes related to respective V/E items. The contractor's licensed professional engineering consultants and the contractor assume any and all responsibility for the design and suitability in terms of performance, of hybrid systems installed, as contractor's Professional of Record, absolving the original project Professional of Record (identified on the original Contract Documents, released for the original project Bid/Negotiation) from responsibility for the V/E hybrid systems portion of the work.

C. The contractor, via the offer and acceptance of value engineering items on the project agrees to provide professional engineering design services and take full and complete responsibility for the hybrid design. Further, the contractor's (V/E Items) professional of record (either employees, or independent consultants to the contractor) through the offer and acceptance of V/E items, agree to indemnify and hold harmless the project owner, the owner's original A/E team (Professional of Record on behalf of the owner for the original Contract Documents) their heirs and assigns in regard to the V/E changes and their impact on the systems altered, affected or modified, in whole or in part. The Professional of Record shown on the original Contract Documents in regard to the systems altered, adjusted, revised, modified or otherwise affected by the value engineering items implemented, shall be absolved of design responsibility as a result of implementation of V/E items, and their original use of Engineering Seals used for original Contract Documents, shall not apply.

D. Contractor shall refer to subsequent specification sections for additional requirements for submission and approval of VE items.

1.13 PROJECT RECORD DOCUMENTS

A. Keep Project Record Documents in accordance with general provision requirements of the specifications.

B. During construction period, keep accurate records of installations paying particular attention to major interior and exterior underground and concealed piping, ductwork, etc.

C. The Contractor shall obtain a minimum of one (1) set of the contract documents including all addenda and change orders (including CAD/Revit files) as prepared by the Architect/Engineer.

D. If the Contractor elects to vary from the Contract Documents and secures prior approval from the Architect/Engineer for any phase of the work, he shall record in a neat and readable manner all such variances on the contract documents in red ink. Prior to requesting substantial completion, the marked-up set of contract documents shall be returned to the Architect/Engineer for approval.

E. All deviations from sizes, locations and from all other features of the installation shown in the Contract Documents shall be recorded.

F. In addition, it shall be possible using these drawings to correctly and easily locate, identify and establish sizes of all piping, directions, and the like, as well as other features of work which will be concealed underground and/or in the finished building.

G. Locations of underground work shall be established by dimensions to columns, lines or walls, locating all turns, etc. and by properly referenced centerline or invert elevations and rates of fall.

H. For work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases, this may be by dimension. In others, it may be sufficient to illustrate the work on the drawings in relation to the spaces in the building

near which it was actually installed. The decision of the Architect/Engineer in this matter will be final.

I. The following requirements apply to all Record Drawings:

1. They shall be maintained at the Contractor's expense.
2. All such drawings shall be done carefully and neatly.
3. Additional drawings shall be obtained at the Contractor's expense.
4. They shall be kept up-to-date during the entire course of the work and shall be available upon request for examination by the Architect/ Engineer and when necessary, by other trades, to establish clearances for other parts of the work.
5. Record Drawings shall be returned to the Architect/Engineer upon completion of the work and are subject to approval of the Architect/ Engineer.
6. CAD/Revit files can be provided upon request (proper release forms must be completed). Contractor shall update CAD/Revit files to reflect As-Built conditions and shall submit revised file back to Architect/Engineer as part of the close-out documents.

1.14 OPERATION AND MAINTENANCE DATA

A. Refer to the specification Sections related to PROJECT CLOSEOUT or OPERATION AND MAINTENANCE DATA for procedures and requirements for preparation and submittal of maintenance manuals.

B. Provide the Owner with three (3) copies of printed instructions indicating various pieces of equipment by name and model number, complete with parts lists, maintenance and repair instructions and test and balance report.

C. COPIES OF SHOP DRAWINGS WILL NOT BE ACCEPTABLE AS OPERATION AND MAINTENANCE INSTRUCTIONS.

D. This information shall be bound in plastic hardbound notebooks with the job name, Architect and Engineer names permanently embossed on the cover. Rigid board dividers with labeled tabs shall be provided for different pieces of equipment. Submit manuals to the Architect for approval.

E. In addition to the operation and maintenance brochure, the Contractor shall provide a separate brochure which shall include registered warranty certificates on all equipment, especially any pieces of equipment which carry warranties exceeding one (1) year.

F. As part of the O & M binders, contractor shall include copies of all studies and test reports performed as part of this project, including but not limited to, the following:

1. Acceptance Testing Reports
   a. Grounding Tests
   b. Thermographic Tests
   c. Torque Values
   d. Rotation Tests
2. Fire Alarm System 100% Test Report
3. Short Circuit Study Report – Updated to Reflect Installed Conditions
4. Coordination Study Report – Updated to Reflect Installed Conditions
5. Arc Flash Study Report – Updated to Reflect Installed Conditions
6. Tele/Data system testing report(s)
7. All specified photos of installations including open trenches, grounding terminations, pole foundation rough-ins, etc…

G. The operation and maintenance brochure shall be furnished with a detailed list of all equipment furnished to the project, including the serial number and all pertinent nameplate data such as voltage, amperage draw, recommended fuse size, rpm, etc. The Contractor shall include this data on each piece of equipment furnished under this contract including but not limited to those items listed below.

1. Lighting Fixtures
2. Electrical Gear (Loadcenters, Panelboards, Transformers, Safety Switches, Circuit Breakers, Contactors/Relays). This includes Short-Circuit Study, Coordination Study and Arc-Flash Study.
3. Dimmer Switches
4. Fire Detection and Alarm System
5. Receptacles
6. Toggle Switches
7. Wiring Device Box Support Brackets
8. Tele/Data Systems
9. Cover Plates
10. Wire
11. Occupancy/Motion Sensors
12. Dimming Systems/Lighting Control Systems
13. Floor Boxes
14. Transient Voltage Surge Suppressors (TVSS)/Surge Protective Devices (SPDs)
15. Lighting Emergency Battery Packs

1.15 EXCAVATING AND BACKFILLING

A. Provide excavating and backfilling necessary for Work of this Division. Comply with provisions of specification section pertaining to Site Work, if applicable.

B. Trenches shall be inspected by Code Authorities and/or Owner's Representative before and after piping is laid. Give Owner's Representative 24-hour notice for each inspection. If any trenches are filled without Owner's Representative and/or authority having jurisdiction inspection and as subsequently found to be deficient, the trenches shall be uncovered, inspected, and then re-filled, if requested by Owner's Representative. Prior to covering any and all underground facilities, including but not limited to conduit, ground rods, terminations, etc., Contractor shall take clear and concise digital photos and shall forward said photos to Engineer prior to covering said utilities.

C. Provide minimum 24 inches of cover to finish grades or paving at raceways.

D. Protect and maintain trenches in dry condition until piping has been inspected and approved. Immediately after approval, backfill trenches in tamped layers. Repeat backfill and tamping 6 months after initial coverage has been accomplished to avoid swale development from sinking soils.

E. Compact fill to satisfaction of Architect and/or Owner's Representative.

F. Prior to any excavating, Contractor shall be responsible for having all utilities in the area of excavation located and marked by an approved company with a minimum of five (5) years' experience locating underground facilities. This includes all owner owned utilities on their site.

G. Approximate locations shown on the drawings shall not be used. Any facility damaged by the Contractor's underground work shall be repaired and/or replaced at no additional cost to the Owner

1.16 CUTTING AND PATCHING

A. Comply with requirements of the Specifications regarding cutting and patching. Locate and timely install sleeves as required to minimize cutting and patching.

B. Cutting, fitting, repairing, patching, and finishing of Work shall be done by craftsmen skilled in their respective trades. Where cutting is required, cut in such a manner as not to weaken structure, partitions, or floors. Holes required to be cut must be cut or drilled without breaking out around the holes. Where patching is necessary in finished areas of the building, the Architect will determine the extent of such patching and refinishing.

C. Repairing Roadways and Walks: Where this contractor cuts or breaks roadways or walks to lay the piping, he shall repair or replace these sections to match existing, unless specifically identified as the responsibility of others.

1.17 PAINTING

A. Painting shall be provided under the Specification section regarding painting, unless specified otherwise. Leave exposed piping, materials, and equipment clean and free of rust, grease, dirt, etc. before and after painting.

B. Factory finished equipment, fixtures, and materials which are marred, chipped, scratched, or otherwise unacceptable shall be repaired or replaced under this Division to Architect satisfaction, at no additional cost to Owner.

C. Coordinate all painting requirements with prime bidder prior to bids.

D. All exposed conduit, materials, hangers, anchors, etc., are to be primed and painted. Color shall match adjacent surfaces where not specifically designated otherwise. All galvanized materials shall be suitably treated prior to painting to ensure adhesion.

E. All exterior electrical gear (panels, meter cans, CT can, switchboards, safety switches, etc.) shall be painted to match adjacent wall surface(s). All interior panels (flush mount) shall have their covers painted to match adjacent wall surface(s).

F. All exterior receptacles, junction boxes, speakers, trumpets, shall be painted to match adjacent wall surface(s).

1.18 EXISTING CONDITIONS

A. The Electrical Contractor shall visit the building site to determine existing conditions and will be held responsible for allowing for these conditions in his bid.

B. Note that this area of work will have storm drainage, mechanical and electrical utilities located underground and within and under the buildings. It is part of this work for the Contractor to determine the scope and location of all utilities to be installed with this project and arrange his work around others. There will be no extra consideration for work discovered as being hidden after the bid, and no change orders for extra cost that may be caused by unknown after bid conditions. The drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Architect reserves

the right to make reasonable changes in locations indicated, before roughing-in, without additional cost to the Owner.

1.19 PROTECTION OF APPARATUS

A. The Contractor shall take precautions necessary at all times to properly protect his apparatus from damage. Failure on the part of the Contractor to comply with the above to the Architect's satisfaction shall be sufficient cause for the rejection of the particular piece of apparatus in question.

1.20 MINOR DEVIATIONS

A. The Contractor shall realize that the drawings cannot delve into every step, sequence, or operation necessary for the completion of the project without drawing on the Contractor's experience. Only typical details are shown on the plans. In cases where the Contractor is not certain about the method of installation of his work, he shall ask for details. Lack of details will not be an excuse for improper installation.

1.21 SALVAGED MATERIALS

A. The Owner shall have priority for the selection of salvaged material and equipment. Any equipment, light fixtures, devices, ballasts, materials, etc. selected to remain property of the Owner shall be removed and delivered to a location on the site as designated by the Owner. Material and equipment not retained by the Owner shall become the property of this Contractor and shall be removed from the site by him.

B. The Contractor shall obtain written approval of all material and equipment determined not to be salvaged by the Owner.

1.22 SAFETY PRECAUTIONS

A. Work methods and project safety are the Contractor's sole responsibility.

B. Contractor shall furnish and place proper guards for prevention of accidents. He should provide and maintain any other necessary construction required to secure safety of life or property, including maintenance of sufficient lights during all day and night hours as required to secure such protection.

C. Temporary electrical services during construction should be maintained in perfect condition. Frayed, lose or opened connections should not be used for temporary services. The Contractor should use only equipment in first class working condition for construction services.

1.23 TEMPORARY CONSTRUCTION LIGHTING

A. The Contractor should provide and install construction lighting as required by General Contractor and other trades. The installation shall conform to requirements of the National Electrical Code.

1.24 SUPERVISION

A. Contractor shall personally, or through an authorized and competent representative, constantly supervise the work done from beginning to completion and final acceptance. To the best of his ability, he shall keep the same foreman and workmen throughout the project duration. Foreman shall be present at project site at all times while work under this section

of the contract documents is being performed. Foreman shall be accessible by cellular phone at all times. Respective telephone numbers shall be forwarded to Architect/Engineer prior to commencement of work on this project.

1.25 CAD/REVIT FILES

A. ADG will provide, upon request, CAD/Revit files to the contractors for use in preparing submittals and record drawings. Plans will be provided at a cost of $10.00 per drawings sheet requested. By submitting request for CAD/Revit files, contractors automatically consent to the verbiage contained in the CAD/Revit release form contained in the plans. This includes any all limitations, restrictions, indemnifications, etc… contained therein.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Panelboards, safety switches, equipment cabinets, motor starters and other equipment shown on the drawings and furnished and/or installed under this section of the Specifications shall be labeled with laminated plastic nameplates inscribed to identify equipment with description shown on the drawings for panels, the name of the equipment controlled for motor starters, or the system or function involved for other equipment. Provide typewritten panelboard directories indicating the equipment served and its location using final approved room numbers, etc., as directed by the Architect. Refer to specification section – Electrical Distribution System and details(s) for additional requirements.

PART 3 - EXECUTION

3.1 COORDINATION OF TRADES

A. Where work is in close proximity to the work of other contractors, the Contractor shall review plans of other contractors and coordinate his work with theirs. The Electrical Contractor shall verify the location of lighting fixtures, beams, structural members, conduit, ductwork, pipes or other obstructions before beginning his work in the area. Notify the Architect where proper clearances do not occur or where the work of others would interfere with the safe and/or proper operation of this work.

3.2 SUPPORTS AND FOUNDATIONS

A. Support all items covered by this Specification directly from building structural members independent of any ceilings or any other installed item. Panelboards and switches may be attached to suitably reinforced walls. Ground or slab mounted equipment shall be mounted on a separate four-inch-high concrete slab. Extending 6" beyond equipment footprint on all sides.

B. Do not attach items of this Specification to HVAC ductwork, ceiling grids and ceiling support members, piping or other equipment unless specifically shown otherwise. Where applicable, all equipment including conduit shall be supported from overhead wall, floor or roof structures using galvanized channel or angle members for a rigid support. Position supports and equipment such that access through lay-in ceilings or panels is not impaired and all Code required clearances are maintained.

C. Where applicable, under no circumstances is the Contractor to attach to or support from any bar joist bridging. Any supports to the bar joists or any structural systems shall be approved

by the Architect. All supplemental angle or channel iron required to support equipment of this Specification shall be furnished by the Electrical Contractor.

3.3 EQUIPMENT LAYOUT

A. The physical location and arrangements of electrical equipment is shown on the Plans and is to be used by the Contractor as a guideline in construction. It is the responsibility of the Contractor to review the Plans with the proposed equipment and equipment of other contractors that are affected, and to ensure that all Code required clearances, wiring distances and maintenance accesses, including equipment heights, of all items are maintained. Alternate arrangements to accomplish the above due to field conditions or changes in physical size of the equipment proposed for the project are to be submitted to the Architect for review before any work is begun or equipment ordered.

B. All electrical gear arrangements shall be presented in a 1/4-inch scaled drawing showing all equipment, including those of other contractors. This includes all electrical rooms, mechanical rooms, mechanical yards, electrical yards, service platforms, boiler rooms, etc… Include shop drawing cut sheets and applicable information. Indicate on the drawing by dimension all required Code clearances, wiring distances and maintenance access requirements. Where equipment heights are required to be coordinated with architectural or other items, indicate revised heights. Refer to "MOUNTING HEIGHTS."

3.4 GUARANTEE

A. The Contractor shall guarantee all materials, equipment and workmanship for a period of one (1) year from the date of final acceptance of the project. This guarantee shall include furnishing of all labor and material necessary to make any repairs, adjustments or replacement of any equipment, parts, etc. necessary to restore the project to first class condition. This guarantee shall include the replacement of lamps. Warranties exceeding one (1) year are hereinafter specified with individual pieces of equipment.

B. If the Contractor's office is in excess of a fifty (50) mile radius of the project, he shall appoint a local qualified contractor to perform any emergency repairs or adjustments required during the guarantee period. The name of the contractor appointed to provide emergency services shall be submitted to the Architect/Engineer for approval.

3.5 CLEANING

A. Refer to the Specification Section relating to PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.

B. Clean all light fixtures, and lenses prior to final acceptance and replace inoperable drivers or LED modules.

END OF SECTION 26 00 01

SECTION 26 05 00 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions; as appropriate, apply to the work specified in this section.

B. Refer to all portions of the Contract Documents as well as the plans and specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

PART 2 - PRODUCTS

2.1 WIRE (600 VOLT AND BELOW)

A. All conductors used in the work shall be soft drawn annealed copper having a composition of not less than 98% of pure copper. Conductors shall be standard code gauge in size, insulated, and shall have insulation rated for use at 600 volts. The contractor's bid shall reflect the use of all copper conductors unless specifically indicated otherwise. When aluminum conductors are used as part of the V.E. process, their use shall be limited to circuits, feeders and services rated 150 Amperes and larger and shall be of the high alloy, compact stranded type, Southwire SIM pull THHN, SIM pull THWN or equivalent. It shall be the contractor's responsibility for properly upsizing the conductors and associated conduit to achieve the equivalent ampere rating of the circuit/feeder/service as specified for copper conductors. As part of this VE item, Contractor shall provide an updated riser diagram (one-line diagram) indicating proposed conductor changes.

B. Unless otherwise noted or specified, insulation shall be Type THWN. Wires shall be of the single conductor type and shall be stranded. Wire insulation shall not contain any asbestos materials.

C. Wire #8 AWG and smaller may be type MC-cable where allowed by applicable codes and ordinances.

D. Throughout the system, conductors shall be identified as to phase and voltage of system by color-coding. Color-coding shall be continuous the full length of wire for all wire sizes. Identification by permanent paint bands or tags at outlets will not be acceptable. Surface printing at regular intervals on all conductors shall indicate manufacturer, size, voltage, and insulation type. White and/or gray colored insulation shall be used for grounded conductors and only for grounded conductors.

E. The color code assigned to each phase wire shall be consistently followed throughout the project. The following systems of color-coding shall be strictly adhered to:

1. 208/120 Volt, 3-Phase, 4-wire Wye Systems
   a. Grounding leads = green
   b. Grounded neutral leads = white
   c. Ungrounded phase wires = black, red and blue
2. 120/240 Volt, 1-Phase, 3-Wire Systems
   a. Grounding leads = green
   b. Grounded neutral leads = white

c. Ungrounded phase wires = black, red

3. 277/480 Volt, 3-Phase, 4-wire Wye Systems
   a. Grounding leads = green
   b. Grounded neutral leads = gray
   c. Ungrounded phase wires = brown, orange, yellow

F. Where multiple neutral conductors are installed in a common raceway, the neutral conductor for each circuit shall be separately identified in accordance with the National Electric Code (NEC).

2.2 CONDUIT

A. Unless otherwise specified or shown on the drawings, all conduit shall be rigid galvanized steel (RGS), electrical metallic tubing (EMT), or rigid nonmetallic conduit (PVC) as allowed in the paragraphs below.

B. RGS may be used for conduit shown run underground (red concrete encasement required), may be used in concrete slabs, and shall be used for conduit run exposed to the weather (locations defined as damp locations and wet locations in Article 100 of the NEC) and shall be run in hazardous areas.

C. EMT shall be used for conduit not encased in concrete, not exposed to the weather, not run underground, and not run in hazardous areas.

D. PVC may be used for conduit run in concrete slabs or may be run underground (underground only where permitted by NEC and local ordinances). Concrete encasement will not be required on underground runs unless specifically noted or specified elsewhere. PVC shall not be run exposed nor concealed in walls nor above ceilings nor in hazardous areas. When rigid nonmetallic conduit (PVC) is installed underground, it shall be Schedule 80 at all underground road crossings, at all underground driveway crossings, and when required by the NEC or local ordinance or specified otherwise. PVC Schedule 40 may be used at all other underground locations. The only use of exposed above ground PVC conduit shall be for telephone service entrance use up utility poles (Schedule 80 required), for CATV service entrance use up utility pole (Schedule 80 required) or for power utility service entrance use up utility pole (Schedule 80 required).

E. Where PVC is utilized for underground installations, RGS 90^{o} elbows and conduit shall be utilized to turn conduit vertical and to rise up to above grade/slab. Red concrete encasement shall be required for all elbows and vertical conduits. Refer to detail on plans.

F. All conduit shall be new and shall bear the inspection label of the Underwriters Laboratories, Inc. (U.L.).

G. Where multiple conduits are installed underground in the same trench, carlon snap-n-stac spacers, or approved equivalent, shall be utilized and spaced a maximum of 5'-0" apart. Provide pre-cast, 4" thick, concrete bases at each spacer and where conduits are turned to be installed in a vertical orientation. Provide spacers immediately before and after all elbows and where conduit transitions from underground to above ground.

H. Fittings for rigid steel conduit and EMT shall be hot-dipped galvanized and shall be of an approved type specially designed and manufactured for their purpose.

I. All flexible conduit, where installed indoors and outdoors, shall be of the flexible liquid tight metallic type. Flexible weatherproof electrical conduit is prohibited from use on this project.

J. Metallic conduit shall be metallized, sheradized, or hot-dipped galvanized.

K. Where conduit is installed exposed in finished spaces and on the exterior of the building (excluding mechanical, equipment and electrical rooms), conduit shall be painted to match adjacent surfaces (color as selected by the Architect/Engineer). All other conduit installations shall be complete with factory applied paint finish as manufactured by Allied Tube and Conduit (True Color EMT) or Wheatland Tube Company (Color Check Conduit). All fittings, couplings, boxes, covers, etc. shall match color of conduit. Color of conduit shall comply with color code noted below.

Power and Lighting - Non-Emergency	Standard Conduit Finish
Fire Alarm	Red
Tele/Data/CATV	Green
Security/CCTV	Purple

2.3 METAL-CLAD CABLE (600 VOLTS AND BELOW)

A. Where permitted by NEC and local codes and ordinances, metal-clad (MC) cables may be used in lieu of conduit and wiring specified elsewhere herein.

B. Installation of MC cables shall be in compliance with the National Electric Code (NEC).

C. Conductors shall be softdrawn annealed copper having a composition of not less than 98% of pure copper.

D. Conductors shall be solid -type, standard Code gauge in size, insulated, and shall be rated for use at 600 volts or below. Minimum size shall be No. 12.

E. Conductor insulation shall be of a type listed in the NEC and be rated for 75 deg. C (167 deg. F) as a minimum and shall be of a type approved for use in MC cable.

2.4 EXPANSION FITTINGS

A. Each conduit that is buried in or rigidly secured to the building construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings shall be made of hot-dipped galvanized malleable iron and shall have a factory-installed packing, which will prevent the entrance of water, a pressure ring, and a grounding ring.

B. In addition to the grounding ring, a separate grounding conductor shall be provided. This grounding conductor shall be an external flexible copper ground securely bonded by approved grounding straps on each end of the fitting. Grounding conductor may be omitted when expansion fitting includes an approved integral grounding conductor or device.

C. Where conduits are buried in concrete, they shall cross the building expansion joints at right angles. Ends of conduit shall be provided with insulated bushings.

2.5 OUTLET BOXES

A. Outlet boxes in concealed conduit systems shall be flush mounted. Boxes shall be galvanized steel of sufficient size to accommodate devices shown and shall have raised covers. Requirements of the NEC shall be minimum.

B. Boxes for lighting fixtures shall be four-inch (4") octagon, not less than 1-1/2" deep. Where boxes are installed in concrete, boxes designed for this application shall be used.

C. Outlet boxes for switches and receptacles in concealed work shall be 4" square, and not less than 1-1/2" deep. Flush mounted outlet boxes shall be installed with plaster rings.

D. Outlet boxes for switches and receptacles installed in exposed conduit system shall be cast iron or cast aluminum Type FD or approved equivalent.

E. Where multiple outlet boxes are shown to be installed at the same location, they shall be installed using B-Line Series BB8 mounting bracket or approved equivalent. Where single boxes are shown to be installed, the B-Line Series BB2 mounting bracket or approved equivalent shall be used.

F. Outlet boxes for adjacent rooms shall not be installed in the same stud space to minimize sound transmission.

G. Outlet boxes used for lighting toggle switches shall have outlet box stabilizer(s) installed.

H. Outlet boxes installed in rated walls shall receive appropriately rated putty pads as manufactured by 3M or STI.

2.6 PULL BOXES

A. Furnish and install pull boxes. Boxes shall be code gauge galvanized steel with screw attached access panels unless noted otherwise in top, side or bottom as required.

2.7 OUTLET COVER PLATES

A. Unless otherwise noted, all outlets including telephone outlets, television outlets, computer outlets, etc. shall be fitted with cover plates of the type indicated below.

B. Cover plates shall be uniform in design and finish for switches, receptacles, and other outlets requiring cover plates. Plates shall be one (1) piece of the required number of gangs. Sectional plates shall not be used.

C. Cover plates shall be brushed aluminum or stainless steel 302/304.

D. Provide blank coverplates for all un-used/empty device boxes including, but not limited to tele/data, CATV, access controls, etc....boxes.

2.8 WIRING DEVICES

A. Wiring devices shall be as listed in the following table, except that color of device shall match color of outlet cover plate. Where cover plates are aluminum or stainless steel, device color shall be as selected by the Architect. The “*” in the model numbers indicate color selection to be made.

1. Leviton / Hubbell (or equivalent by Pass and Seymour)
Single Pole-20A (5621-2* / DS120*)
Rocker or Paddle Switch

2. Three Way-20A (5623-2* / DS320*)
   Rocker or Paddle Switch

3. 20A 125V 2P 3W Duplex (16342-* / DR20*)
   Decora Style
   Grounded Receptacle

4. 20A 125V 2P 3W Duplex (G5362-00*/ GFRST20SNAP*)
   GFCI Receptacles (Indoor)

5. 20A 125V 2P 3W Duplex (G5362-WT*/ GFTWRST20*)
   GFCI Receptacles (Outdoor)

6. 30A 250V 2P 3W (5372 / HBL9630FR)
   Grounded Receptacle

7. 50A 250V 2P 3W (5374 / HBL9650FR)
   Grounded Receptacle

2.9 WEATHERPROOF RECEPTACLES

A. Weatherproof receptacles shall be duplex receptacles of the ground fault current interrupting type as specified under WIRING DEVICES, mounted in a cast iron or cast aluminum Type FD (or approved equivalent) conduit fitting with Leviton No. 5997-DGY, (or approved equivalent) clear, extra deep GFCI Style weather resistant cover. Weatherproof receptacles shall be flush mounted in exterior walls whenever possible.

2.10 DIMMER SWITCHES

A. Dimmer switches shall be Legrand Radiant series, Acuity Brands nLight nPODMA series, Acuity Brands sPODMA series or approved equivalent. Ratings shall be of appropriate wattage for the circuits to be controlled. Provide and install all required 0-10V. control interface units for all LED lighting circuits. Dimmer loading shall not exceed 80% of the dimmer rating. Dimmers shall be UL listed.

2.11 FLOOR OUTLETS/FLOOR BOXES

A. Floor outlets shall consist of the assembly of wiring devices, floor boxes and fittings. Floor boxes shall be16 gauge galvanized sheet metal complete with fusion-banded epoxy paint. Boxes shall be fully adjustable before concrete pour.

B. Contractor shall adjust box such that coverplate is flush against floor surface. When multiple floor outlets are shown directly adjacent to each other, multiple gang type boxes with separating partitions between each gang shall be utilized. Provide separate conduit for each function.

C. Floor boxes shall be round with threads for conduits or hubs as required and be of suitable height for concrete slab use. Box shall be capable of accepting duplex receptacles and/or other wiring devices or usage as indicated.

D. Each floor box shall be Legrand Resource RFBA Series Round Activation floor boxes, (or equivalent) with round covers. Quantity of gangs/size of box shall be individually determined

by each location's requirements. Provide equivalent fire-rated poke-thrus as required by floor assemblies.

E. Where box is to be installed in an existing concrete slab above the ground level, caution must be taken to ensure that the structural integrity of the slab is not impaired by the box installation. Coordinate with the Architect. Use a core drill, poke through device, fire rated to at least the rating of the floor system, as per National Electrical Code (NEC). Depth of unit shall be as required. Hole by the Electrical Contractor. Color by Architect during shop drawing submittal. Color choices shall include satin brass, nickel, grey powder coated, brass, bronze, brushed aluminum, black power-coated, brass-plated, bronze-plated and/or satin nickel-plated.

F. As a minimum, provide and install two (2) 120V duplex convenience receptacles, four (4) RJ-45 data outlets in each floor box, four (4) USB charging ports and two (2) HDMI ports.

PART 3 - EXECUTION

3.1 MOUNTING HEIGHTS

A. Unless otherwise noted on the drawings or required by the Architect/Engineer, the mounting heights set forth below shall apply. Dimensions given are from finished floor to the top of the device unless noted otherwise noted.

1.	Toggle Switches	4'-0" to top of device
2.	Receptacles	1'-6" to bottom of receptacle
3.	Panelboards	6'-7" to top of can
4.	Tele/Data Outlets	1'-6" to bottom of outlet
5.	Clock and Bell Outlets	7'-6"
6.	Fire Alarm Audio/Visual	6" from ceiling on wall and in between 80" and 96"*
7.	Fire Alarm Hand Stations	4'-0" to top of device
8.	Fire Alarm Visual Only	6" from ceiling on wall *
9.	Electric Water Cooler	Concealed behind unit **

* Mounting height shall be 6" from ceiling or maximum 80" above finished floor, whichever is lowest.

** Contractor shall be responsible for coordinating exact location in field with the plumbing contractor.

B. Where overcurrent or safety switch devices are shown to serve exterior equipment, the Contractor shall review in detail with the Architect/Engineer proposed exterior mounting locations, mounting heights, conduit routing, etc., and receive approval prior to rough-in.

C. Where overcurrent or safety switch devices are shown to serve condensing units, the top of the overcurrent device shall be 3'- 0" AFG or level with the top of the condensing unit(s) whichever is lower. Refer to detail on plans for additional requirements.

3.2 WIRE (600 VOLT AND BELOW)

A. Service entrance, feeders, and motor circuit conductors shall be run their entire length without joints or splices. Splices and joints in branch circuit wiring shall be only at outlets or in accessible junction boxes.

B. Joints and splices in branch circuit wiring shall be made with compression type solderless connectors. Connectors of the nonmetallic screw on type are not acceptable.

C. Terminations or splices for conductors # 6 AWG and larger shall utilize Burndy Unitap, Polaris Black or equivalent connectors.

D. Unless otherwise specified, all wiring shall be installed in conduit.

E. No wire shall be smaller than No. 12 for power or lighting service, fixture whips or for switch legs. Wire for each branch circuit shall be of a single size and type from the branch circuit protective device to the last outlet on the circuit unless noted otherwise.

F. Not more than three (3) branch circuits shall be installed in a raceway for three-phase electrical systems. For single phase electrical systems, the number of circuits in any one raceway shall be limited to two (2).

G. Branch circuit home run numbers shown on the drawings shall be used for connection of circuit wiring to similarly numbered protective devices in branch circuit panelboards.

H. Where the length of a home run, from panel to the first outlet exceeds 75 feet (75') for 120-volt circuits or 175 feet (175') for 277-volt circuits, the conductor size shall be No. 10 AWG or that shown on the drawings, whichever is larger.

I. For all 3-phase circuits, contractor shall provide and install a full-size neutral conductor and a grounding conductor for a complete 5-wire circuit. If the neutral conductor is not required by the equipment, contractor shall install wire nuts on each end of the neutral conductor for future use.

3.3 CONDUIT

A. When conduits are shown to be installed in the floor slab, under the floor slab, or underground, whenever possible and approved by the Architect/Engineer, conduits one-inch (1") trade size and smaller shall be installed in the concrete floor slab. Conduits embedded in concrete slabs shall have lateral spacing not less than three diameters except where the slab has been specially designed to accommodate closer spacing.

B. Conduits larger than one-inch (1") trade size shall not be installed in the floor slab and shall be installed a minimum of twelve inches (12") below the floor slab.

C. Conduits shown underground but not in or under a floor slab shall be installed not less than twenty-four inches (24") below grade. Conduit locations shall be identified by means of 4" wide; detectable, red warning/ marker tape installed in trench in accordance with NEC requirements.

D. Prior to backfilling of trenches and /or providing concrete encasement, contractor shall take photographs of conduit installation including spacers/supports and concrete support blocks. In addition, prior to backfilling trenches and after concrete encasement, take additional photographs of installation. Submit photographs to engineer upon request.

E. Rigid conduit joints shall be made with threaded fittings made up tight with at least five threads fully engaged. Compression type threadless fittings and setscrew type fittings shall not be used for RGS unless specifically approved in writing by the Architect/Engineer.

F. Couplings and connectors for EMT shall be compression type or cast-iron set screw type.

G. Where conduits enter boxes or cabinets that do not have threaded hubs the conduit shall be secured in place with galvanized locknuts inside and outside and shall have bushings inside for interior locations. All exterior terminations shall be made with Meyers hubs or approved equivalent. Conduits larger than one inch (1") shall have galvanized insulating bushings.

H. All conduits shall be installed as indicated or scheduled on the drawings and shall be of sufficient size to accommodate the required number of insulated conductors including equipment-grounding conductor. A grounding conductor shall be pulled in every raceway and properly terminated. The Contractor shall increase the conduit size from that shown on the drawings where necessary to accommodate the equipment-grounding conductor and/or where to comply with the NEC.

I. Unless otherwise noted, conduit shall be run concealed. Conduit runs from wall mounted receptacles, toggle switches, etc. shall be run concealed in walls whenever possible.

J. Conduit runs shall be straight; elbows and bends shall be uniform, symmetrical, and free from dents or flattening. All conduit shall be installed with runs parallel or perpendicular to walls, ceilings and structural members.

K. Conduit shall not be run nearer than three inches (3") to hot water or steam pipes except where crossings are unavoidable. Conduit shall be kept at least one inch (1") from covering of pipe crossed and the conductor size shall be increased one (1) size

L. Conduit shall be held securely in place by approved hangers and fasteners of appropriate design and dimensions for the particular application. Support shall be such that no strain will be transmitted to the outlet box and/or pull box supports. Conduit shall be secured only to the building structure.

M. All conduit runs shall be installed in accordance with all applicable sections of the National Electrical Code and local codes or ordinances.

N. Where empty conduits are shown, a #14 pull wire shall be installed and conduits shall be capped.

O. Terminations to all mechanical equipment and to all dry-type transformers shall be made using a minimum of 12" to a maximum of 24" liquid-tight flexible metallic conduit.

P. At each concealed junction box in the power and lighting system, identify the panel and circuit number(s) contained in the junction box by writing in permanent marker on the outside of the junction box cover.

Q. Where conduits are run from condition spaces to/thru un-conditioned spaces, the ends of the conduits shall be sealed (after conductor installation) to prevent the transmission of air from non-conditioned spaces into the conditioned spaces. Expanding spray foam and EYS seals are approved methods of sealing conduits.

R. For all surface mounted devices, including fire alarm, intercom and nurse call systems, device boxes shall be Wiremold No. R5752 and R5753 or approved equivalent style boxes sized such that device does not overhang edge(s) of back box. Color of box shall match device.

3.4 METAL-CLAD CABLE (600 VOLTS AND BELOW)

A. The metallic sheath shall be galvanized steel or aluminum corrugated sheath type and shall be terminated at outlet boxes, cabinets, etc. with fittings specifically approved for such use, which shall properly ground the metallic sheath.

B. Each metal-clad cable assembly shall have one (1) green insulated ground conductor sized as required by NEC for the application as a minimum size.

C. Where run in walls, cable shall be fastened using B-Line Series BX4 or approved equivalent cable fasteners. Cable shall be fastened to wall stud not more than 8" from entry into device box.

D. MC Cable shall be supported horizontally and vertically every 5' minimum or closer where required by NEC and applicable federal, state and local ordinances.

3.5 WIRING DEVICES

A. All wiring devices installed shall be identified as to which panel serves it and which overcurrent protection device protects the wiring device. This shall be accomplished via panel name and circuit number being written using a permanent marker on the back side of the coverplate. Panel name and circuit number shall be permanently identified on each receptacle coverplate.

3.6 MANUFACTURER'S DIRECTION

A. Contractor shall be responsible for coordinating all aspects of equipment electrical service installation for all electrical gear, devices, mechanical, plumbing, fire protection, architectural, and owner furnished equipment. Contractor shall obtain and review actual manufacturer's installation instructions and shall install electrical facilities to said equipment in accordance with the instructions, NEC, NFPA and contract documents. Should a discrepancy exist between the manufacturer's installation directions and the contract documents, the engineer shall be notified in writing immediately.

3.7 COORDINATION WITH OTHER TRADES

A. Prior to purchasing and installing any wire and/or conduit for all circuitry to mechanical equipment, owner furnished equipment, and other equipment requiring electrical power furnished by other trades as part of this project, contractor shall review equipment cut sheets and shall verify exact equipment electrical requirements. Any discrepancies between contract documents and equipment submittals shall be immediately brought to the architect/engineer's attention for clarification.

END OF SECTION 26 05 00

SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to all Electrical portions of the specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. Contractor shall provide grounding of service equipment, transformers, non-current carrying conductive surfaces of equipment, cable tray, metallic raceways, fencing, metal buildings, structures and other equipment as specified herein and as shown on the drawings.

1.3 SCOPE

A. The equipment shall be grounded as shown on the plans and as specified herein. All metal structures and equipment, including fences, shall be connected to the systems ground grid. Ground conductors must be as short and straight as possible, protected from mechanical injury and, if practicable, without splice or joint.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Main grounding conductors shall be bare, soft drawn, stranded, single conductor copper wire, and generally sized as follows:

1. Ground grid cable: #3/0 AWG
2. Equipment and structures to grid conductor: #3/0 AWG

2.2 CONNECTORS

A. All connectors shall be of the exothermically welded type.

2.3 GROUND RODS

A. Ground electrodes shall be copper-clad steel rods nominal 3/4 inch in diameter and ten feet (10') long.

2.4 EXOTHERMIC WELD PROCESS

A. All wire-to-wire exothermic welds shall be the parallel type. Wire-to-wire rod connections shall be "T" type. To establish a basis of design for quality and type, the following is a partial list of approved Cadweld type connections. Approved equivalent connectors by other manufacturers may be utilized.

Connections	Cadweld Type

Parallel cable-to-cable	PG
Cable to ground rod	GR, FT, NT or NX
Cable to steel	VN
Cable to lug	LA
Cable to rebar	Consult factory (similar to RR)

PART 3 - EXECUTION

3.1 EXPOSED NON-CURRENT-CARRYING METAL PARTS

A. Ground connections to equipment or devices shall be made as close to the current-carrying parts as possible; that is, to the main frame rather than supporting structures, bases or shields. Grounding connections shall be made only to surfaces that are clean and dry. Steel surfaces shall be ground or filed to remove all scale, rust, grease and dirt. Copper and galvanized steel shall be cleaned to remove oxide before making welds or connections. Code size ground conductors shall be run in all conduits containing circuits protected by overcurrent devices; then properly terminated.

B. All raceways, cable racks, cable trays, conduits, armored or shielded cable or cables with ground and all exposed non-current carrying metal parts shall be grounded. Such items shall be bonded together and permanently grounded to the equipment ground bus. Conduits shall be connected by the grounding bushings or clamps to ground bus. Flexible “jumpers” shall be provided around all raceway expansion joints. Bonding straps for steel conduit shall be copper. Jumper connections shall be provided to effectively ground all sections of rigid conduit connected into plastic pipe. No metallic conduit shall be left ungrounded. In conduit systems interrupted by junction or switch boxes where locknuts and bushings are used to secure the conduit in the box, the sections of conduit and box must be bonded together using grounding bushings.

C. Any conduits entering low voltage (600 volts or below) equipment through sheet metal enclosure and effectively grounded to enclosure by hub need not be otherwise bonded. Both ends of ground buses in switchboards, etc., shall be separately connected to the main ground bus to form two (2) separate paths to ground.

D. All metal buildings shall be grounded by separate grounding conductor and ground rods. Fencing (existing and new) shall be grounded as specified herein and as shown on the drawings. Where exposed to physical damage, the ground wires shall be suitably protected with PVC conduit enclosures. Cables below grade shall be laid with a reasonable amount of slack to reduce the possibility of breakage.

3.2 EXOTHERMIC WELD PROCESS

A. The grounding grid shall be installed and connected as specified herein and as shown on the drawings using an exothermic weld process (Cadweld or other approved manufacturer). Where bolted connections are required, brass/bronze 2-hole pads exothermically welded to the grounding conductor shall be used.

B. All exothermic weld grounding connections shall be made using exothermic welded Cadweld (or other approved manufacturer) connections, tools and materials.

C. Unless noted otherwise, all copper-to-copper or copper-to-steel splices and terminating specified shall be made with exothermic welds.

D. Steel surfaces shall be ground or filed to remove the galvanizing coating and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be repainted with an approved galvanized paint after the welds are made.

E. Copper surfaces shall be sanded to remove oxides and the surface cleaned and dried thoroughly prior to making the welds. All welds shall be painted with an approved anti-oxide manufactured by T&B or Burndy (or other approved manufacturer) to prevent corrosion.

F. Brass/bronze split bolts shall be used to connect the fence grounding conductors where shown on the drawings.

G. Where bolted connections are specified, brass/bronze 2-hole pads shall be utilized except for equipment manufactured neutral and ground busses. The equipment to be grounded shall be cleaned of all paint, dirt, and rust prior to making the bolted connection. All bolts, nuts, washers, and lock washers shall be stainless steel. All such connections shall be coated with an approved anti-oxide compound. Only one (1) 2-hole pad shall be terminated on one (1) set of bolts, nuts and washers.

H. Where approved in writing by the Engineer, brass/bronze pipe ground clamps or 2 set screw 2-hole pads may be used for special conditions.

I. Where grounding conductors or PVC conduits penetrate walls, floors, etc., these openings and conduits shall be sealed with Dow Corning No. 2001 Silicone RTV (or other prior approved manufacturer) after installation is complete.

J. Provide gradual bends for all grounding grid cables wherever possible. Sharp bends will not be permitted. The minimum being radius should be 8 inches.

K. The Contractor shall notify the Architect/Engineer when the buried grounding grid is completed for inspection by the Engineer prior to backfilling. Notification should be no less than 24 hours prior to scheduling the backfill of trenches.

L. The Contractor shall test the grounding grid resistance and continuity. The testing shall be performed after all underground and above ground connections have been made. Refer to "Acceptance Testing" specification section for additional requirements.

END OF SECTION 26 05 26

SECTION 26 05 71 - ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract apply to the Work specified in this Section.

B. Refer to all Electrical Sections of the Specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 SUMMARY

A. This section outlines the acceptance testing requirements and division of responsibility.

1.3 SCOPE

A. Contractor shall engage the services of a recognized independent NETA Certified testing firm or professional electrical engineering firm for the purpose of performing inspections and tests as herein specified.

B. The testing firm shall provide all materials, equipment, labor and technical supervision to perform such test and inspections.

C. It is the intent of these tests to assure that all electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

D. The tests and inspections shall determine suitability for energization.

1.4 REFERENCES

A. All inspections and tests shall be in accordance with the latest editions following applicable codes and standards except as provided otherwise herein.

1. National Electrical Code – NEC
2. National Electrical Manufacturer's Association - NEMA.
3. American Society for Testing and Materials - ASTM
4. Institute of Electrical and Electronic Engineers – IEEE
5. National Electrical Testing Association – NETA
6. American National Standards Institute – ANSI
7. State Codes and Ordinances
8. Insulation Cable Engineers Association – ICEA
9. National Electrical Safety Code – NESC

B. All inspections and tests shall utilize the following references:

1. Project Design Specifications
2. Project Design Drawings
3. Manufacturer's Instruction Manuals applicable to each particular apparatus.

1.5 QUALIFICATIONS OF TESTING AGENCY

A. The testing/engineering firm shall be a corporately independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by the testing firm.

B. The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations and systems.

C. The testing firm shall have been engaged in such practices for a similar size project.

D. The testing firm shall utilize only full-time technicians who are regularly employed by the firm. Electrically unskilled employees are not permitted to perform testing or assistance of any kind. Electricians and/or linemen may assist but may not perform testing and/or inspection services.

E. The testing firm shall submit the "on site" foreman's qualifications and experience through the Contractor at the pre-construction conference for review and approval by the Engineer.

F. Contractor shall submit statement of qualifications of proposed testing firm at the pre-construction conference for approval and acceptance by the Engineer.

1.6 DIVISION OF RESPONSIBILITY

A. Testing firm shall perform the following tests as outlined in these specifications:

1. Ground Resistance Tests
2. Thermographic Survey

B. Contractor shall perform the following tests as outlined in these specifications:

1. Low Voltage Cable
2. Phasing and Rotation Tests

1.7 TEST REPORT

A. The test report shall include the following:

1. Summary of project.
2. Description of project.
3. Description of test
4. Test results.
5. Conclusions and recommendations.
6. Appendix, including appropriate test forms.
7. Identification of test equipment used.
8. Signature of responsible test organization authority.

B. Furnish three printed (3) copies of the complete report to the Engineer prior to requesting substantial completion and no later than thirty (30) days after completion of testing procedures unless directed otherwise. After acceptance of the report, Contractor shall submit an electronic copy of the report in PDF format.

C. All tests shall be performed with apparatus de-energized except where otherwise specifically required.

D. The testing firm shall have a designated safety representative on the project to supervise operations with respect to safety.

E. The testing firm shall have a calibration program that assures that all applicable test instrumentation is maintained within rated accuracy. The accuracy shall be directly traceable to the National Bureau of Standards. Instruments shall be calibrated in accordance with the following frequency schedule:

F. Field Instruments: Analog - 6 months maximum
Digital - 12 months maximum

G. Laboratory Instruments: 12 months

H. Leased specialty equipment: 12 months

I. Dated calibration labels shall be visible on all test equipment.

J. Records must be kept up to date which show date and results of instruments calibrated or tested.

K. An up-to-date instrument calibration instruction and procedure will be maintained for each test instrument.

L. Calibrating standard shall be of higher accuracy than that of the instrument tested.

1.8 GENERAL

A. An outline of tests required is included in this section. Refer to applicable NETA, ANSI, NEMA, IEEE and other test standards for exact procedures, methods and requirements.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TESTS

A. Upon completion of the work, the entire electrical system shall be tested and shall be shown to be in perfect working condition, in accordance with the intent of the specifications.

3.2 GROUND RESISTANCE TESTS

A. Inspect ground system for compliance with plans and specifications.

B. Perform 3-point fall-of-potential test per IEEE Standard No. 81, Section 9.04 on the main grounding electrode or system.

C. Perform the 2-point method test per IEEE No. 81, Section 9.03 to determine the grounding resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.

D. Alternate Method to Item C Above: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. This test shall be made by passing a minimum of ten (10) amperes dc current between ground reference system and the ground point to be tested. Voltage drop shall be measured and resistance calculated by voltage drop method.

E. The main ground electrode system resistance to ground shall be no greater than one (1) ohm at the pad mounted transformer at the Service Entrance and at all step-down/step-up transformers.

3.3 LOW VOLTAGE CABLE, 600 V MAXIMUM

A. Compare cable data with drawings and specifications. Inspect exposed sections of cables for physical damage and correct connection in accordance with one-line diagram.

B. Verify tightness of accessible bolted connection by calibrated torque wrench in accordance with manufacturer's published data. Perform thermographic survey.

C. Inspect compression-applied connectors for correct cable match and indentation.

D. Verify cable color-coding with applicable Engineer's specifications.

E. For all service entrances, switchboards, MCC and all panelboard feeders, perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for one minute.

F. Perform continuity test to insure correct cable connection.

G. Bolt-torque levels shall be in accordance with manufacturer's requirements. Measure and record results.

H. Minimum insulation-resistance values shall be not less than 50 mega-ohms.

I. Investigate and report on all deviations between adjacent phases.

3.4 PHASING AND ROTATION:

A. Perform phasing test on each circuit tie section energized by separate sources.

B. Perform tests from permanent source.

C. Damage caused due to omission of this test shall be corrected at Contractor's expense.

3.5 THERMOGRAPHIC SURVEY:

A. Thermographic survey shall be performed with equipment utilizing long wave technology that provides photo record of deficient areas.

B. Equipment to be inspected shall include all current-carrying devices installed under this contract, generally, all new high and low voltage cable terminations and splices. Specific equipment to be surveyed includes the following.

1. Panelboards
2. TVSS Units
3. Loadcenters
4. Safety Switches (fused and non-fused)

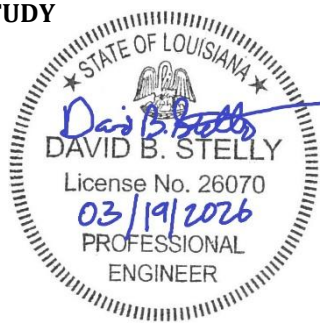
C. Inspect physical, electrical and mechanical condition. Remove all necessary covers prior to thermographic inspection.

D. Provide report including the following:

1. Discrepancies.
2. Temperature difference between the area of concern and the reference area.
3. Cause of temperature difference.
4. Areas inspected. Identify inaccessible and/or unobservable areas and/or equipment.
5. Identify load conditions at time of inspection.
6. Provide photographic thermograms of all equipment (non-deficient and deficient areas). Provide corresponding digital photograph (non-thermal image) of electrical equipment scanned.
7. Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 degree C at 30 degrees C.
8. Equipment shall detect emitted radiation and convert detected radiation to visual signal.
9. Thermographic surveys should be performed during periods of maximum possible loading but not less than 40 percent of rated load of the electrical equipment being inspected. Refer to NFPA 70B-1994, Section 18-16 (Infrared Inspection).
10. Temperature differences for 1 degree C to 3 degrees C indicate possible deficiency and warrant investigation.
11. Temperature differences of 4 degrees C to 15 degrees C indicated deficiency; repair as time permits.
12. Temperature differences of 16 degrees C and above indicate major deficiency; repair immediately.

END OF SECTION 26 05 71

SECTION 26 05 72 - OVERCURRENT PROTECTIVE DEVICE SHORT-CIRCUIT STUDY



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Short-circuit study input data, including completed computer program input data sheets.
2. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
    b. Revised single-line diagram, reflecting field investigation results and results of short-circuit study.

C. At the conclusion of the project, contractor shall have the specified studies updated to reflect “As-Installed” conditions and submit the revised studies as part of the O&M manuals. This includes final documented utility information with available primary side fault current and

photo of transformer nameplate, the electronic software data files, PDF of the study and PDF's of the appropriate labels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Short-Circuit Study Specialist and Field Adjusting Agency.

B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.6 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Short-Circuit Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. SKM Systems Analysis, Inc.
2. ETAP

B. Comply with IEEE 399 and IEEE 551.

C. Analytical features of fault-current-study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.

D. Comments and recommendations for system improvements, where needed.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.

G. Short-Circuit Study Output:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Calculated asymmetrical fault currents:
      i. Based on fault-point X/R ratio.
      ii. Based on calculated symmetrical value multiplied by 1.6.
      iii. Based on calculated symmetrical value multiplied by 2.7.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. No AC Decrement (NACD) ratio.
   e. Equivalent impedance.

f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Obtain all data necessary for the conduct of the study.

1. Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Engineer.
2. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E

B. Gather and tabulate the following input data to support the short-circuit study. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Obtain electrical power utility fault current contribution at point of connection utilizing calculated values. “Infinite bus” primary shall not be utilized as basis of the study.
4. Documentation of power utility data shall be included in the report.
5. Power sources and ties.
6. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
7. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
8. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
9. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
10. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
11. Motor horsepower and NEMA MG 1 code letter designation.
12. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.2 SHORT-CIRCUIT STUDY

A. Perform study following the general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on the device characteristics supplied by device manufacturer.

D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 10 kA or less.
2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:

1. Electric utility's supply termination point.
2. Incoming switchgear.
3. Unit substation primary and secondary terminals.
4. Low-voltage switchgear.
5. Motor-control centers.
6. Control panels.
7. Standby generators and automatic transfer switches.
8. Branch circuit panelboards.
9. Disconnect switches.

3.3 ADJUSTING

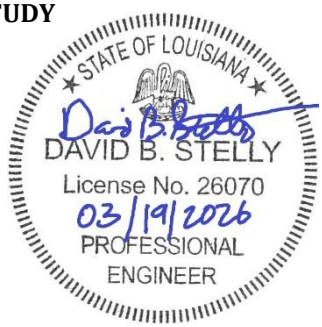
A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.

3.4 DEMONSTRATION

A. Train Owner's operating and maintenance personnel in the use of study results.

END OF SECTION 26 05 72

SECTION 26 05 73 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Coordination-study input data, including completed computer program input data sheets.
2. Study and equipment evaluation reports.
3. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.
    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

C. At the conclusion of the project, contractor shall have the specified studies updated to reflect "As-Installed" conditions and submit the revised studies as part of the O&M manuals. This includes final documented utility information with available primary side fault current and

photo of transformer nameplate, the electronic software data files, PDF of the study and PDF's of the appropriate labels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Coordination Study Specialist and Field Adjusting Agency.

B. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   a. The following parts from the Protective Device Coordination Study Report:
      i. One-line diagram.
      ii. Protective device coordination study.
      iii. Time-current coordination curves.
   b. Power system data.

1.7 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Coordination Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Coordination Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Software Developers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. SKM Systems Analysis, Inc.
b. ETAP

B. Comply with IEEE 242 and IEEE 399.

C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:
   a. Arcing faults.
   b. Simultaneous faults.
   c. Explicit negative sequence.
   d. Mutual coupling in zero sequence.

2.2 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

A. Executive summary.

B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."

F. Protective Device Coordination Study:

1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
   a. Phase and Ground Relays:
      i. Device tag.
      ii. Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
      iii. Recommendations on improved relaying systems, if applicable.
   b. Circuit Breakers:
      i. Adjustable pickups and time delays (long time, short time, ground).
      ii. Adjustable time-current characteristic.
      iii. Adjustable instantaneous pickup.

iv. Recommendations on improved trip systems, if applicable.

c. Fuses: Show current rating, voltage, and class.

G. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:

1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
4. Plot the following listed characteristic curves, as applicable:
   a. Power utility's overcurrent protective device.
   b. Medium-voltage equipment overcurrent relays.
   c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
   d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
   e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
   f. Cables and conductors damage curves.
   g. Ground-fault protective devices.
   h. Motor-starting characteristics and motor damage points.
   i. Generator short-circuit decrement curve and generator damage point.
   j. The largest feeder circuit breaker in each motor-control center and panelboard.
5. Series rating on equipment allows the application of two series interrupting devices for a condition where the available fault current is greater than the interrupting rating of the downstream equipment. Both devices share in the interruption of the fault and selectivity is sacrificed at high fault levels. Maintain selectivity for tripping currents caused by overloads.
6. Provide adequate time margins between device characteristics such that selective operation is achieved.
7. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 PROTECTIVE DEVICE COORDINATION STUDY

A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.

B. Comply with IEEE 399 for general study procedures.

C. The study shall be based on the device characteristics supplied by device manufacturer.
D. The extent of the electrical power system to be studied is indicated on Drawings.

E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 10 kA or less.
2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:
   a. Inrush current when first energized.
   b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
   c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

H. Motor Protection:

1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
2. Select protection for motors served at voltages more than 600 V according to IEEE 620.

I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

J. Generator Protection: Select protection according to manufacturer's written recommendations and to IEEE 242.

K. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.

L. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:

1. Electric utility's supply termination point.
2. Switchgear.
3. Unit substation primary and secondary terminals.
4. Low-voltage switchgear.
5. Motor-control centers.
6. Standby generators and automatic transfer switches.
7. Branch circuit panelboards.

M. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.
2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.

3.3 LOAD-FLOW AND VOLTAGE-DROP STUDY

A. Perform a load-flow and voltage-drop study to determine the steady-state loading profile of the system. Analyze power system performance two times as follows:

1. Determine load-flow and voltage drop based on full-load currents obtained in "Power System Data" Article.
2. Determine load-flow and voltage drop based on 80 percent of the design capacity of the load buses.
3. Prepare the load-flow and voltage-drop analysis and report to show power system components that are overloaded or might become overloaded; show bus voltages that are less than as prescribed by NFPA 70.

3.4 MOTOR-STARTING STUDY

A. Perform a motor-starting study to analyze the transient effect of the system's voltage profile during motor starting. Calculate significant motor-starting voltage profiles and analyze the effects of the motor starting on the power system stability.

B. Prepare the motor-starting study report, noting light flicker for limits proposed by IEEE 141 and voltage sags so as not to affect the operation of other utilization equipment on the system supplying the motor.

3.5 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the overcurrent protective device study.

1. Verify completeness of data supplied in the one-line diagram on Drawings. Call discrepancies to the attention of Engineer.
2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E.

B. Gather and tabulate the following input data to support coordination study. The list below is a guide. Comply with recommendations in IEEE 551 for the amount of detail required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its

representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Electrical power utility impedance at the service.
3. Obtain electrical power utility fault current contribution utilizing calculated values. “Infinite bus” primary shall not be utilized as basis of the study.
4. Documentation of power utility data shall be included in the report.
5. Power sources and ties.
6. Short-circuit current at each system bus, three phase and line-to-ground.
7. Full-load current of all loads.
8. Voltage level at each bus.
9. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
10. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
11. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
12. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
13. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
14. Maximum demands from service meters.
15. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
16. Motor horsepower and NEMA MG 1 code letter designation.
17. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
18. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.
19. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
    a. Special load considerations, including starting inrush currents and frequent starting and stopping.
    b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
    c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
    d. Generator thermal-damage curve.
    e. Ratings, types, and settings of utility company's overcurrent protective devices.
    f. Special overcurrent protective device settings or types stipulated by utility company.
    g. Time-current-characteristic curves of devices indicated to be coordinated.
    h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
    i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.

j. Panelboards, switchboards, motor-control center ampacity, and SCCR in amperes rms symmetrical.

k. Identify series-rated interrupting devices for a condition where the available fault current is greater than the interrupting rating of the downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.6 FIELD ADJUSTING

A. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.

B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.

C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

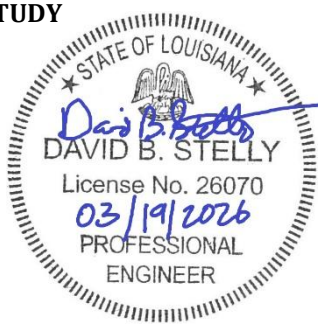
3.7 DEMONSTRATION

A. Engage the Coordination Study Specialist to train Owner's maintenance personnel in the following:

1. Acquaint personnel in the fundamentals of operating the power system in normal and emergency modes.
2. Hand-out and explain the objectives of the coordination study, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting the time-current coordination curves.
3. Adjust, operate, and maintain overcurrent protective device settings.

END OF SECTION 26 05 73

SECTION 26 05 74 - OVERCURRENT PROTECTIVE DEVICE ARC-FLASH STUDY



PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.4 ACTION SUBMITTALS

A. Product Data: For computer software program to be used for studies.

B. Other Action Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.

1. Arc-flash study input data, including completed computer program input data sheets.
2. Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.
    a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

C. At the conclusion of the project, contractor shall have the specified studies updated to reflect “As-Installed” conditions and submit the revised studies as part of the O&M manuals. This includes final documented utility information with available primary side fault current and photo of transformer nameplate, the electronic software data files, PDF of the study and PDF’s of the appropriate labels.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Arc-Flash Study Specialist and Field Adjusting Agency.

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.

B. Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.7 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.

B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.

1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

A. Software Developers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. SKM Systems Analysis, Inc.
   b. ETAP

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary.

B. Study descriptions, purpose, basis and scope.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Cable size and lengths.
3. Transformer kilovolt ampere (kVA) and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center and panelboard designations.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output: As specified in "Short Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."

F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

G. Arc-Flash Study Output:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. No AC Decrement (NACD) ratio.
   e. Equivalent impedance.
   f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
   g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude with and without required Arc Energy Reduction methods.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3.5-by-5-inch thermal transfer label of high-adhesion polyester for each work location included in the analysis.

B. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Flash protection boundary.
4. Hazard risk category.
5. Incident energy.
6. Working distance.
7. Engineering report number, revision number, and issue date.

C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies:

1. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

C. Calculate maximum and minimum contributions of fault-current size.

1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations, except equipment rated 240-V ac or less fed from transformers less than 125 kVA.

F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.

G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:

1. Fault contribution from induction motors should not be considered beyond three to five cycles.
2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g., contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).

H. Arc-flash computation shall include both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
2. When the line terminals of the circuit breaker are separate from the work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.

1. Verify completeness of data supplied on the one-line diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to the attention of Engineer.
2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Obtain electrical power utility fault current contribution utilizing calculated values. “Infinite bus” primary shall not be utilized as basis of the study.
4. Documentation of power utility data shall be included in the report.
5. Power sources and ties.
6. Short-circuit current at each system bus, three phase and line-to-ground.
7. Full-load current of all loads.
8. Voltage level at each bus.

9. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in per cent, and phase shift.
10. For reactors, provide manufacturer and model designation, voltage rating and impedance.
11. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
12. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
13. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
14. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
15. Motor horsepower and NEMA MG 1 code letter designation.
16. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
17. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.

3.4 LABELING

A. Apply one arc-flash label for 600-V ac, 480-V ac, and applicable 208-V ac panelboards and disconnects and for each of the following locations:

1. Motor-control center.
2. Low-voltage switchboard.
3. Switchgear.
4. Medium-voltage switch.
5. Control panel.

3.5 APPLICATION OF WARNING LABELS

A. Install the arc-fault warning labels under the direct supervision and control of the Arc-Flash Study Specialist.

3.6 DEMONSTRATION

A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 26 05 74

SECTION 26 09 23 - OCCUPANCY SENSORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to all other Electrical specification sections, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. Contractor shall provide and install motion sensors in accordance with the plans and specifications herein. System shall be installed to provide detection system coverage of the entire space the sensors are located in. It is understood that due to some manufacturer's devices providing different coverage patterns, the plans represent a generic system. Contractors shall evaluate each space individually and shall at no additional costs to the owner, provide additional detection sensors where required to provide a complete coverage pattern and shall also adjust installation locations to retain the coverage while reducing false triggers of the sensors.

PART 2 - PRODUCTS

2.1 WALL MOUNTED SENSORS

A. For single-pole/single switch applications wall mounted motion sensors shall be IR-TecLDS700S, Watt Stopper No.: DSW-100, Lutron MS-A102, Greengate ONW-D-1001-MV, Leviton ODS10, Acuity Controls (Sensor Switch) WSX-PDT.

B. For two-pole/dual switch applications, wall mounted motion sensors shall be IR-TecLDT700S or Watt Stopper No.: DSW-200, Greengate ONW-D-1001-DMV, Leviton ODSOD, Acuity Controls (Sensor Switch) WSX-PDT-2P.

C. Color of sensor shall be selected by Architect/Engineer during shop drawing submittal.

2.2 CEILING MOUNTED SENSORS

A. Ceiling mounted motion sensors shall be IR-Tec-BDS-600S, Watt Stopper No. DT-305, Lutron LOS-CDT-2000-WH, Greengate OAC-DT-2000, Sensor Switch CM-PDT-9 (or 10 depending upon coverage required for space) or approved equivalent.

B. All relays, contactors, and power packs required to provide a fully operational system shall be provided and installed at no additional cost to the owner.

C. Install device using properly sized device box recessed in ceiling. Utilize MC-cable to run all conductors. Install power pack in properly rated junction box.

D. Color of sensor shall be selected by Architect/Engineer during shop drawing submittal.

2.3 POWER/SWITCH PACKS

A. Power packs shall employ zero crossing circuit to limit inrush current. Contacts shall be dry-type (Isolated) twenty-ampere (20A). Leads shall be Class 2 Teflon insulated for use in plenums. Power pack shall be rated for both 120 volt and 277-volt operation.

B. Install device using properly sized device box recessed in ceiling. Utilize flexible conduit to run all control voltage conductors. Install power pack in properly rated junction box.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Should a particular manufacturer's product require that additional sensors and associated wiring and accessories be provided to allow full and complete coverage of the space, the additional sensors and associated wiring and accessories shall be provided at no additional cost to the owner.

B. Installation of motion sensor shall be such that motion is detected as soon as a person enters the particular room and with the sensor being a minimum of four feet (4') from any HVAC diffuser/register.

C. All sensors shall be installed on the line side of all toggle switches so that power is maintained to the sensor at all times.

D. Prior to requesting substantial completion, contractor shall coordinate with the owner to determine the length of time the sensors shall keep the lighting illuminated after the room if vacated and shall program sensors accordingly. Time shall be adjustable from a minimum of 5 minutes to a maximum of 30 minutes. Contractor shall provide a minimum of one additional setting adjustment per sensor installed for the duration of the one-year warranty period.

3.2 SUBMITTALS

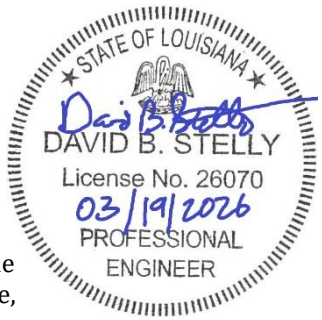
A. Prior to installation, contractor shall submit a proposed layout in shop drawings indicating all sensor and power pack locations. The sensor Contractor shall be responsible for such layout.

B. At time of substantial completion, contractor shall submit how each and every sensor is programmed including but not limited to trigger on technology, maintain on technology, time delay to off.

3.3 MISCELLANEOUS ITEMS

A. Contractor shall be responsible for providing all relays, contactors, power packs, etc. to provide a complete motion detecting lighting switching circuit.

END OF SECTION 26 09 23



SECTION 26 27 13 - ELECTRICAL DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions); as appropriate, apply to the work specified in this section.

B. Refer to all Electrical specification sections, as well as the plans and specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 ELECTRIC SERVICE

A. Contractor shall modify existing normal 480 volt 3 phase 4 wire electrical system(s) at the facility as specified herein and noted on the drawings. This Contractor shall be responsible for the coordination of all electrical work with the local utility company. Contractor shall be responsible for determining the proper breakers and connectors to tie into the existing electrical systems. Short circuit current interrupting rating of new breakers shall match rating of existing breakers. Contractor shall be responsible for examining the panelboards to be tied into, building structure, and site, and shall include in his bid all materials and time (regular pay and overtime pay) to install the new feeders avoiding conflicts with existing equipment to remain.

1.3 GENERAL

A. All electrical gear furnished as part of this project, panelboards, switchboards, motor control centers, dry-type transformers, safety switches, etc. shall be of the same manufacturer unless specified otherwise. Electrical equipment manufactured by a subsidiary or parent company of manufacturer that is prior approved is not itself prior approved unless its own manufacturer's name specifically is listed as being prior approved.

1.4 ARC-FLASH; COORDINATION AND FAULT CURRENT STUDIES

A. As part of the electrical gear shop drawings, the contractor shall perform and submit complete arc–flash, coordination and fault current studies, including phase-to-phase and ground faults for coordinating all elements of the distribution system. These three studies shall be performed and furnished by the successful electrical gear manufacturer. Contractor shall refer to these specification sections for specific study requirements: These studies shall be submitted simultaneously with the gear submittal, or the gear submittal will be returned un-reviewed.

1. Overcurrent Protective Device Short-Circuit Study (Cannot be VE'd from project)
2. Overcurrent Protective Device Coordination Study
3. Overcurrent Protective Device Arc-Flash Study (Cannot be VE'd from project)

B. Provide all arc-flash safety and short circuit current stickers on all panels, switchboards, safety switches, motor control center, etc. as required/specified. Refer to details for additional requirements. Proposed stickers for each individual piece of gear shall be submitted for review as part of shop drawings.

C. Provide and install a fully coordinated electrical distribution system as directed by the Overcurrent Protective Device Coordination Study at no additional costs to the Owner.

D. In addition, this study shall indicate all required settings for adjustable circuit breakers and motor circuit protectors. These settings include instantaneous, short time, long time, ground fault trip characteristics and all-time based pick-up, drop-out and re-close parameters.

E. The contractor shall provide all breakers, trip plugs, solid state breakers, etc. to provide a fully coordinated electrical system as identified in the coordination study. This shall be accomplished as part of the Base Bid and all alternates at no additional costs to the owner and/or design team.

F. Refer to individual specification sections of each specified study for additional requirements.

G. Electrical gear submittals will not be reviewed until all device studies specified are performed, submitted and approved.

H. At the conclusion of the project, contractor shall have the specified studies updated to reflect "As-Installed" conditions and submit the revised studies as part of the O&M manuals. This includes the electronic software data files, PDF of the study and PDFs of the appropriate labels.

1.5 SERIES RATING OF EQUIPMENT

A. The electrical gear provided and installed as part of this project shall not be series rated.

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Panelboards shall be circuit breaker type using quick-make, quick-break, trip free, thermal magnetic trip indicating, bolt-on circuit breakers. Two and three pole branches and mains shall be common trip. Panelboards shall be dead front safety type with main breaker or main lugs, and number and size of branches as shown on the drawings. Panelboards shall have single, feed through, or double lugs, to accommodate feeder conductors as shown on the drawings, and shall have neutral and ground bus for termination of conductors. Bussing shall be copper.

B. Doors shall be fitted with flush cylinder locks, keys to which shall all on project be alike. Two (2) keys shall be furnished for each lock. Cabinet fronts shall be finished as directed by the Architect/Engineer. Cabinet fronts shall not be removable with door in the locked position. Provide for each panel a directory frame with waterproof transparent plastic window on inside of door and place therein a typewritten identification of all circuits.

C. Directories shall be made only after permanent room numbers have been assigned. Room numbers shown on the construction drawings shall not be used for making directories. Each circuit shall be clearly identified as to use and location (ex: Receptacles Rooms 201, 202 or Lighting Rooms 207, 209, 211, and 213).

D. Cabinets shall be galvanized steel not less than twenty inches (20") in width. Gutters shall not be smaller than minimum dimensions required by the National Electrical Code.

E. Double section panelboards shall be comprised of cabinets of equal dimensions.

F. All panels rated NEMA 1, shall be of the door-in-door type construction providing tool-less access to interior of the panelboard(s).

G. Panelboards shall be as shown in the schedules and shall be completely factory assembled. Do not purchase panelboards or cabinets until shop drawings have been approved. Approved manufacturers include:

1. General Electric
2. Square D
3. Eaton-Cutler Hammer
4. Siemens
5. Approved Equivalent

H. Minimum short circuit current interrupting ratings for circuit breakers shall be 10,000 amps. Where a specific interrupting rating is shown on the drawings, in the panel schedules, or as required by the coordination and fault current study, panelboards and associated circuit breakers shall be rated for that value as a minimum at no additional cost to the owner.

I. In branch circuit panelboards having two (2) vertical columns of devices, circuit numbers shall be such that, starting at the top, odd numbers shall be used in sequence down the left-hand side. See Schedule of Panelboards on drawings for circuit device sizes and number of poles.

J. Construction of panelboards shall be such that, where applicable, any three (3) adjacent single-pole devices are individually connected to each of the three different phases in such a manner that 2 or 3 pole devices, when available, can be installed at any location.

K. UL Listing: Panelboards shall be listed by UL and bear the UL label.

L. Interior panelboards shall be NEMA 1 unless noted otherwise. All exterior panelboards shall be rated NEMA 3R.

2.2 LABELS

A. All switchboards, panelboards, starters, VFD's, contactors, transformers, safety switches and fused safety switches installed by this contractor shall have laminated phenolic tags with 1/4" characters embossed thereon identifying the equipment by name, voltage, ampacity, phase and number of current carrying conductors such as:

Panel Name
120/208 V - 400A
3 Phase - 4 Wire
Fed From Panel: _____, Circuit _____
Fused @ _____**

The tags shall be fixed to the center of the equipment cover/door with a suitable heavy duty industrial grade adhesive.

**Note – For fused safety switches, label shall include fuse sizes contained therein.

B. Color Coding of labels shall be as follows:

Normal Power White Background with Black Letters

2.3 DRY-TYPE TRANSFORMERS

A. Dry-type transformers shall be three phase, 60 cycle with 480-volt delta primary windings and 120/208 volt, 4-wire wye secondary windings with capacities and mounting arrangements as indicated on the drawings. Each transformer shall have four (4) 2-1/2% FCBN taps, except that two (2) full current taps above normal and two (2) below normal will be acceptable where this is manufacturer's standard for the particular size.

B. Transformers shall have internally isolated core and coil and shall be built with 220 Class insulation and shall have a temperature rise not to exceed 115° C where installed indoors or not to exceed 150° C where installed outdoors. Where shown on plans where transformers are stacked, both transformers shall have a temperature rise not to exceed 80° C, under full load in an ambient temperature of 40° C. Windings shall be copper.

C. Units shall be designed for quiet operation with core and coil completely isolated from the enclosure by vibration absorbing mounts. Sound levels shall not exceed 45 db for 75 KVA or below, or 50 db for units above 75 KVA in an ambient of 24 db.

D. Enclosures shall be NEMA 1 for secured interior locations, NEMA 3R for secured exterior locations, and totally enclosed for all unsecured locations.

E. Enclosures shall be constructed of heavy code gauge steel with terminal compartments located at the bottom of each unit. Circuit connections shall be made through flexible metallic conduit.

F. Transformers shall be as manufactured by Square D, General Electric, Eaton Electrical, Siemens, or approved equivalent.

2.4 MAGNETIC CONTACTORS

A. The Contractor shall furnish and install contactors where shown on the drawings except that contactors shown mounted in branch circuit panelboards shall be factory mounted by panelboard manufacturer.

B. Contactors shall be of the same manufacturer as the panelboards, disconnect switches, etc.

C. Contactors shall be suitable for use at the voltage rating of the circuits controlled and shall have the number of poles and ampere rating shown on the drawings as a minimum. Where ampere ratings are not shown, ratings shall be 20 amperes minimum, or as required to match the supply feeder protective device.

D. Main contacts shall be double break silver alloy to silver alloy type protected by arching contacts. Contacts shall be self-aligning and renewable from the front of the panel.

E. Contactors shall be Underwriters' Laboratories, Inc. listed under UL 508, 11th Edition. Contactors shall be fully rated and marked for use with motor loads, tungsten lamp loads, and ballast lamp loads.

F. Remote control stations shall be three-wire momentary contact type with indicator light. Stations shall be arranged as indicated on the drawings and shall be furnished by the contactor manufacturer.

G. Contactors shall be mounted in suitable enclosures for locations shown with hinged cover and latch.

2.5 LIGHTING CONTACTORS

A. The Contractor shall furnish and install lighting contactors where shown on the drawings except those contactors shown mounted in branch circuit panelboards shall be factory mounted by panelboard manufacturer. Contactors shall be suitable for use at voltage rating of circuits controlled and shall have the number of poles and ampere rating shown on the drawings as a minimum.

B. The contactor amp rating shall be continuous per pole for all types of ballast and tungsten lighting, resistance and motor loads. The contactor shall have totally enclosed, double-break silver-cadmium-oxide power contacts. Auxiliary arcing contacts are not acceptable. Contact inspection and replacement shall be possible without disturbing line or load wiring. The contactor shall have straight-through wiring with all terminals clearly marked. The contactor shall be approved per UL508 and/or CSA and be designed in accordance with NEMA ICS2-211B. They shall be industrial-duty rated for applications to 600 volts maximum. The contactor shall have the following:

1. Control-circuit fuse holder, with one (1) fuse.
2. 0.2-60 second TDE (Time Delay Energize) and TDD (Time Delay De-energize) timer attachments.

C. The contactor shall have a NEMA Type 1 enclosure and shall be the mechanically held type.

D. Coil-clearing contacts shall be supplied so that the contactor coils shall be energized only during the instance of operation. Both latch and unlatch coils shall be encapsulated.

2.6 SAFETY SWITCHES

A. Furnish and install safety switches at locations and in capacities shown on the drawings, as hereinafter specified and/or as required by the latest edition of the National Electrical Code.

B. Safety switches shall be rated heavy duty and fusible.

C. Safety switches exposed to the weather shall be rated NEMA 3R.

D. Safety switches shall be of the solid neutral type where required by circuit or feeder specified.

E. Safety switch covers shall be internally mechanically held closed when in the ON position and shall be allowed to open in the OFF position. The switch shall come equipped with provisions to allow the switch to be padlocked in the off position.

F. Galvanized angle or other suitable supports shall be provided for switches that cannot be mounted on walls or other rigid surfaces. Switches shall not be supported by conduit alone and shall not be mounted on HVAC or other equipment unless specifically approved by the Architect/Engineer. Verify mounting heights for all exterior locations with Architect/Engineer prior to rough-in.

G. Fuses shall be installed so that fuse rating and type are clearly and easily readable from the front of the disconnect.

H. Safety switches shall be General Electric, Square "D", Eaton Electrical, Siemens or approved equivalent.

2.7 FUSES

A. Unless otherwise noted or specified, all fuse holders shall be equipped with dual-element, time-lag, and current limiting fuses. Provide one (1) spare set of fuses for each size initially

installed, with a minimum of three (3) fuses of each size. Spare fuses shall be turned over to the Owner's maintenance supervisor prior to requesting substantial completion inspection.

B. Fuses shall be Gould, Bussman, or approved equivalent.

PART 3 - EXECUTION

3.1 MANUFACTURER'S DIRECTION

A. All electrical gear shall be installed in accordance with the manufacturer's directions. Contractor shall review these directions prior to rough-in. Should any discrepancies exist between the contract documents and the manufacturer's direction, contractor shall advise the engineer in writing.

B. All electrical terminations shall be properly tightened to manufacturer's specifications. Where manufacturer's specifications are not available, contractor shall refer to the NEC and adjust tightness valves (torque) to the NEC published values.

C. Install all safety switches, breakers, disconnects, etc., in accordance with manufacturer's directions and maintain all required NEC clearances. Coordinate exact locations in field with applicable contractors.

END OF SECTION 26 27 13

SECTION 26 43 13 - SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment.

1.3 DEFINITIONS

A. I-nominal: Nominal discharge current.

B. MCOV: Maximum continuous operating voltage.

C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.

D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short-circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, I nominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.
3. Copies of test reports from a recognized independent testing laboratory, capable of producing 200kA surge current waveforms, verifying the suppressor can survive published surge current rating on a per mode basis using the ANSI/IEEE C62.41 impulse waveform C3 (8 x 20 microsecond, 20kV/10kA). Test data on an individual module is not acceptable. In house testing will not be accepted.
4. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL SPD REQUIREMENTS

A. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Comply with UL 1449.

D. MCOV of the SPD shall be the nominal system voltage. MCOV shall be a tested value per section 37.7.3 of UL1449 4th Edition.

2.2 PANEL SUPPRESSORS (Type B)

A. Basis of Design: Subject to compliance with requirements. Provide comparable product by the following:

1. Current Technology “TG3”. Equivalent by Square D SurgeLogic “EM Series”

B. SPDs: Listed as Type 1 SPD per UL1449 4th Edition

1. Include LED indicator lights for power and protection status.
2. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include Form-C contacts rated at 2 to 5 A and 24- V ac to 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.

C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per mode shall not be less than 150 kA (Type B), 300kA per Phase. The peak surge current rating shall NOT be the arithmetic sum of the ratings of the individual` MOVs in a given mode. SPD

manufacturer shall provide independent 3rd party testing validating unit is capable of surviving a single surge at the specified rating.

D. Comply with UL 1283 with a maximum attenuation of 34dB based on 50ohm insertion loss test per MIL-STD-220B

E. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277V or 208Y/120V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
2. Line to Ground: [1200 V for 480Y/277 V] [700 V for 208Y/120 V].
3. Neutral to Ground: [1000 V for 480Y/277 V] [700 V for 208Y/120 V].
4. Line to Line: [2000 V for 480Y/277 V] [1200 V for 208Y/120 V]

F. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground: 700 V.
3. Neutral to Ground: 700 V.
4. Line to Line: 1200 V.

G. SCCR: Equal or exceed 200 kA.

H. Inominal Rating: 20 kA

2.3 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 3R.

2.4 CONDUCTORS AND CABLES

A. Power Wiring: SPD shall be equipped with mechanical lugs that can accept up to #2 AWG wire. Where conductors between SPD and switchgear exceed 10’ in total length, they shall be “High Performance Interconnect” (HPI) cables with Ultra Low impedance characteristics at 10kHz and above.

B. Class 2 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 18 AWG, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 14 AWG, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.

C. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground. If installed lead length exceeds 10', SPD manufacturer shall provide a low impedance cable that improves the installed performance.

D. Use crimped connectors and splices only. Wire nuts are unacceptable.

E. Wiring:

1. Power Wiring: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
2. Controls: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

A. Contractor shall perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. An SPD will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.3 SYSTEM TESTING

A. Upon completion of installation, provide the start-up and testing services of a factory-authorized and factory-trained local service representative. The tests shall include:

1. Off-line Testing: Impulse injection to verify the system tolerances as well as verification of proper facility neutral-to-ground bond. Compare field test results to factory benchmark test parameters supplied with each individual unit.
2. On-line Testing: Verify that suppression and filtering paths are operating with 100% protection as well as verification of proper facility neutral-to-ground bond by measuring neutral-to-ground current and voltage and by visual inspection.
3. Voltage measurements from Line-to-Ground (L-G), Line-to-Neutral (L-N), Line-to-Line (L-L), and Neutral-to-Ground (N-G), taken at the time of the testing procedure.

3.4 DOCUMENTATION AND REPORTING

A. Record results of field testing and compare to factory benchmark test parameters supplied with each individual surge protective device. Indicate that the integrity of neutral-to-ground

bonds were verified through testing and visual inspection, and that grounding bonds were observed to be in place.

B. Submit to the Owner's representative and to the Architect/Engineer copies of the startup test results and the factory benchmark testing results for confirmation of proper suppression filter system function, as required by this section. Provide the number of copies as required by Division One and the Electrical General Provisions section; and three copies where not otherwise specified.

END OF SECTION 26 43 13

SECTION 26 51 00 - LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including the Conditions of the Contract (General, Supplementary, and other Conditions) as appropriate, apply to the Work specified in this Section.

B. Refer to other Electrical specifications, as well as the Specifications for the other various trades and materials and be thoroughly familiar with all provisions regarding electrical work.

1.2 GENERAL

A. The Contractor shall furnish and install lighting fixtures and accessories as shown on the drawings and/or described herein. The Contractor shall also furnish and install new lamps for all new fixtures and existing fixtures to be re-used in project area.

B. Unless otherwise specified, lighting fixtures shall be permanently installed and connected to the wiring system.

C. The Contractor shall support each new fixture independently, from the building structure. Ceiling framing members shall not be used to support fixtures except in specific areas where ceiling supports for this purpose have been specified elsewhere in these specifications.

D. Catalog numbers scheduled on the drawings or descriptions of lighting fixtures contained herein may indicate fixture compatibility with certain types of ceiling construction. The Contractor shall determine exact type of ceilings actually to be furnished in each area and shall obtain fixtures to suit, deviating from specified catalog numbers or descriptions only where necessary, and only to the extent necessary to insure fixture-ceiling compatibility. The Contractor shall notify the Architect/Engineer in writing where such changes are to be made. Contractor shall clean all lighting fixtures of dirt and debris upon completion of project prior to requesting substantial completion inspection.

E. Incandescent fixtures for recessed locations shall have a thermal cutout and be installed in accordance with manufacturer's requirements and in accordance with NEC.

F. Unless noted otherwise on the drawings, lamps installed in each fixture shall be of the type specifically recommended by the manufacturer of the fixture for use in the fixture. Fixtures shall not be wired with or have any parts constructed using asbestos materials.

G. All requests for prior approval shall contain the following:

1. Photometric data for each fixture being submitted.
2. For all exterior lighting, point by point foot candle levels shall be submitted. (Exception: Wall packs, ground mounted flood lights, landscape lighting).
3. Listing of all deviations of fixtures proposed as compared to fixtures specified.
4. For interior lighting point by point foot-candle levels shall be submitted for typical interior spaces (offices, classrooms, corridors) and for spaces with indirect and/or specialty lighting.

PART 2 - PRODUCTS

2.1 LAMPS

A. Unless otherwise noted on the drawings or in the light fixture schedule, incandescent lamps shall be inside frosted type and rated 130V. Fluorescent lamps shall be specification grade, tri-phosphor, 3500o K, low mercury content (Philips ALTO or equivalent by GE or Sylvania) energy efficient type, and metallic discharge lamps shall be as scheduled on the drawings.

B. At the time of Substantial Completion, replace lamps in lighting fixtures, which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect/Engineer.

C. Furnish stock or replacement lamps amounting to ten percent (10%), but not less than one (1) lamp in each case, of each type and size lamp used in each type fixture. Deliver replacement stock as directed to Owner's storage space and submit a copy of the delivery receipt prior to requesting substantial completion inspection.

2.2 BALLASTS

A. Ballasts shall be furnished where required to operate fluorescent and metallic discharge lighting fixtures.

B. Fluorescent ballasts shall be multi-voltage programmed-start, parallel sequence, and high-power factor type. Fluorescent ballasts shall be Class P, sound rated A, and shall be provided with an automatic thermal cutout device to de-activate the ballast when it is over-heated. Fluorescent ballasts shall be ETL certified as meeting CBM specifications, and shall be electronic type limiting total harmonic distortion to less than ten percent (10%).

C. Ballasts for use with metallic discharge fixtures shall be programmed-start to operate the type of lamps specified for use with the fixture and shall be constructed in accordance with NEMA, UL, and ANSI standards. In addition, such ballasts shall be designed to limit inrush current on starting to a value less than steady state operating current.

2.3 EMERGENCY BATTERY PACKS

A. Emergency battery packs shall be provided and installed in all fixtures denoted by the letter “E” appearing at the end of the fixture type designation and where required in the light fixture schedule. Emergency battery packs shall be installed in the ballast/driver housing (not on top of the fixture) of the fixture(s) unless specifically noted otherwise on the drawings.

B. At the contractor’s option, a central inverter (or multiples thereof) may be provided in the electrical room(s) to provide emergency lighting as indicated. If contractor elects to implement this option, they shall be responsible for providing the appropriate sub-feed breaker in the lighting distribution panel as well as all required sub-feed circuitry. Any and all required generator transfer devices (GTD’s) shall be provided at no additional costs. All required branch emergency circuitry shall be provided as well as all branch circuit overcurrent protective devices required in the central inverter(s). As part of the lighting submittal package, fixture supplier shall provide connection diagrams indicating installation requirements for the emergency lighting system showing all switching, inverters (battery packs), GTDs, etc.… required for a complete and fully operational emergency lighting system.

C. Operation of the fixture shall be as follows:

Normal A/C Power	Switch Position	Operation of Lamps/LED's
On	On	All lamps/LED's operating
On	Off	All lamps/LED's off
Off	On	Emergency Lamps/LED'S all operating
Off	Off	Emergency Lamps/LED's all operating

D. Emergency operation of the light fixture shall provide a minimum total lamp output of 1200 lumens for a minimum time period of ninety (90) minutes.

E. Emergency battery packs shall be as manufactured by Bodine, Iota Engineering Co., or approved equivalent.

F. The Contractor shall be responsible for any additional wiring, conduit, labor, etc., to provide the emergency lighting system specified at no additional cost to the Owner. This includes running of a continuously energized conductor to each and every battery pack.

2.4 LED FIXTURES

A. Manufacturers of LED luminaires shall demonstrate a suitable testing program incorporating high heat, high humidity and thermal shock test regimens to ensure system reliability and to substantiate lifetime claims.

B. The use of IESNA LM-80 data to predict luminaire lifetime is not acceptable.

C. At time of manufacture, electrical and light technical properties shall be recorded for each luminaire. At a minimum, this should include lumen output, CCT, and CRJ. Each luminaire shall utilize a unique serial numbering scheme. Technical properties must be made available for a minimum of 5 years after the date of manufacture.

D. Luminaires shall be provided with a full, non-pro-rated, non-limited, 5-year warranty covering LEDs, drivers, paint and mechanical components.

1. Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array and electronic driver (power supply).
2. The rated operating temperature range shall be 30°C to +40°C.
3. Each luminaire is capable of operating above 100°F° (37°C), but not expected to comply with photometric requirements at elevated temperatures.
4. Photometry must be compliant with IESNA LF-79 and shall be conducted at 25°C ambient temperature.
5. The individual LEDs shall be constructed such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
6. Luminaire shall be constructed such that LED modules may be replaced or repaired without replacement of whole luminaire.
7. Each luminaire shall be listed with Underwriters Laboratory, Inc. under UL 1598 for luminaires, or an equivalent standard from a nationally recognized testing laboratory.
8. Power Consumption: Maximum power consumption allowed for the luminaire shall be determined by application. The luminaire shall not consume power in the off state.
9. Operation Voltage: The luminaire shall operate from a 60 HZ ± 3HZ AC line over a voltage ranging from 108 VAC to 305 VAC. The fluctuation of line voltage shall have no visible effect on the luminous output.
10. Power Factor: The luminaire shall have a power factor of 0.90 or greater.

11. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent.
12. Surge Suppression: The luminaire onboard circuitry shall include fused surge protection devices (SPD) to withstand high repetition noise transients as a result of utility line switching, nearby lightning strikes, and other interference. The SPD shall protect the luminaire from damage and failure for common mode transient peak voltages up to 10 kV (minimum) and transient peak currents up to 5 kA (minimum) SPD shall conform to UL 1449 depending on the components used in the design. SPD performance shall be tested per the procedures in ANSI/IEEE C62.41-1992 (or current edition for category C (standard). The SPD shall fail in such a way as the luminaire will no longer operate. The SPD shall be field replaceable.
13. Each luminaire shall have integral UL Listed Class II power supplies. Class I power supplies will not be acceptable.
14. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.
15. RF Interference: LED drivers must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.
16. Drivers shall have a Class A sound rating.
17. Illuminance: The illuminance shall not decrease by more than 30% over the expected operating life. The measurements shall be calibrated to standard photopic calibrations.
18. Light Color Quality: The luminaire shall have a correlated color temperature (CCT) range of 3800K to 4200K. The color rendition index (CRI) shall be 80 or greater. Binning of LEDS shall conform to ANSI/G.NEMA SSL 3-2010.
19. Backlight –Uplight-Glare: the luminaire shall not allow more than 10 percent of the rated lumens to project above 80 degrees from vertical. The luminaire shall not allow more than 2.5 percent of the rated lumens to project above 90 degrees from vertical. Backlight and Glare ratings as per fixture schedule and calculated per IESNA TM-15.
20. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
21. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
22. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
23. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.
24. The heat sink shall be aluminum.
25. The luminaires shall be dimmable from 100 percent output to 0 percent output.
26. Driver shall be integral to the fixture and field replaceable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All surface mounted fixtures shall be properly anchored so that all sides of the fixture are butted up against the mounting surface. A minimum of two (2) anchors shall be used; however, where additional anchors are required to properly install fixture (all sides evenly spaced from ceiling), the Contractor shall provide and install them at no additional cost to the Owner.

1. Anchor types shall be as follows:

Mounting Surface Material	Anchor type

* Gypsum board (wall)	Toggle bolts or blocking with screws
Gypsum board (ceiling)	Expansion type anchor
Concrete/concrete block	Expansion type anchor
** Wood	Screws

*Anchor type shall be determined in field by Architect/Engineer as dictated by fixture weight.
** Any fixture installed on combustible material shall be installed on ½ minimum spacers unless prior approved, otherwise in writing by Architect/Engineer.

B. All recessed fixtures in suspended ceiling shall be supported by a minimum of two (2) support wires, at opposite corners of the fixture. Each support wire shall be continuous without splices to the building structure and separately anchored. Fixture support wires shall support only the light fixture and not the ceiling. Surface mounted fixtures installed on lay-in ceiling shall be supported as lay-in fixtures. Refer to details for additional requirements.

END OF SECTION 26 51 00

SECTION 28 05 13 - TELEPHONE/DATA/CATV COMMUNICATION SYSTEM(s)

PART 1 - GENERAL

1.1 The Contractor shall provide, install and connect the complete telephone/data system equipment, backboards, conduit, cable tray, j-hooks, wiring and testing as specified herein and shown on the drawings.

1.2 SCOPE OF WORK

A. This installation includes the furnishing of labor, materials, and equipment required for the installation of all service, inside station, and riser cables for telephone and data use between distribution frames, and to each station outlet location required by the plans and specifications.

B. The work shall include but is not necessarily limited to the following:

1. Furnish and install telephone outlets, data outlets, TV outlets, cables, connecting blocks, backboards, conduits, mounting brackets and associated hardware for bundling, racking and cross-connecting as required.
2. Furnish and install one (1) 1" C from each tele/data outlet concealed up wall to above ceiling. Turn conduits 90̊ and extend conduit to accessible ceiling space. Provide nylon bushings at ends of conduits.
3. Furnish and install two (2) 4-pair EIA - Category 6 UTP telephone/data station cable to each tele/data outlet shown on the drawing and specified herein. Coil 36" of spare cable (for each cable installed) and secure loop at quarter points of the loop. Extend cables to respective termination point(s). Cables shall be plenum rated where installed in plenums.
4. Furnish and install duplex EIA/TIA 568A, 8 pin 4-pair modular RJ45 data jacks at each telephone/data outlet shown on drawings as specified herein. Color of each jack shall comply with owner's color-coding requirements. Verify color coding requirements in writing with owner prior to purchasing jacks.
5. Furnish and install 6-position modular type wall outlets for all telephone/data shown on the plans. Color of wall outlets shall match color of wall devices and shall be selected in shop drawings.
6. Furnish and install grounding and ground bars as shown on the drawings and as specified. Refer to specification section "Grounding" and to details for additional requirements.
7. Contractor shall submit an installation color coding, labeling and testing plan for each floor prior to commencing work.

1.3 APPLICABLE DOCUMENTS

A. The following current issues of rules and regulations shall apply to this scope of work:

1. EIA/TIA 568, 569, 570, 606, TSB36, TSB40
2. Building Industry Consulting Service (BICS)
3. Telephone Standards Handbook GHB-155
4. Planning Handbook CHB-156
5. Design Handbook CHB-157
6. REA Construction and Installation Manuals
7. REA Specification PC4 for Acceptance Tests
8. List of Materials Acceptable for use on telephone systems of REA borrowers

9. National Electric Code (NEC)
10. State and Local Codes
11. Telco System Practices
12. UL

1.4 GENERAL REQUIREMENTS

A. Installation costs including all necessary materials, cables, closures, bridging clips, splice materials, and terminations are to be the responsibility of the Contractor.

B. Cables routed above the drop ceiling and where not installed in conduit shall be supported to the structure utilizing “J” hooks. Cables are not allowed to rest on the ceiling tiles nor building steel. Maximum clearance to other electrical systems shall be maintained.

C. All cables, wires, and equipment shall be securely and neatly installed. Inside routings shall be installed parallel and perpendicular to existing structural lines and members.

D. All cables, wires, and equipment shall be firmly held in place. Fastening and support shall be adequate to support their load with ample safety factors.

E. The Contractor shall be responsible for replacing, restoring, or bringing to original condition any damage to floor, ceilings, walls, furniture, grounds, pavement, etc., caused by his personnel and operations. Contractor shall restore any damage or disfigurements at his expense.

F. Cables shall be continuous; no splices will be allowed.

G. The Contractor shall refer to the Construction Phasing Description section of these specifications for additional information and requirements. It is intended that the Telephone and Data Communications System be placed in service and be of beneficial use to the Owner at the completion of each construction phase of the work prior to occupancy by the Owner.

H. The Contractor shall coordinate all of his work with the Owner's Information Network Department to maintain tele/data service to the old and new systems as may be required. The Contractor will provide all new services as specified and shown on the drawings in a timely manner.

I. The Contractor shall not interrupt existing tele/data services and systems in any way until new facilities are in place and approval is received from the Information Network Department and the Architect/Engineer.

1.5 SUBMITTALS

A. Submit to the engineer shop drawings, product data (including cut sheets and catalog information). Submit shop drawings, product data with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer will indicate approval of shop drawings and product data submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.

B. By submitting shop drawings and product data, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings and product data conform to the requirements of the work and of the contract documents.

C. The engineer remains responsible for the design concept expressed in the contract documents as defined herein.

D. The engineer's approval of shop drawings and product data submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer in writing of such deviation at time of submittal, and the engineer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.

E. The engineer's approval of shop drawings and product data shall not relieve the contractor of responsibility for errors or omissions in such shop drawings and product data.

F. The engineer's review and approval, or other appropriate action upon shop drawings and product data, is for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents. The engineer's review of such submittals is not conducted for the purpose of determining 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 review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The engineer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

G. Perform no portion of the work until the engineer has approved the respective submittal. Such work shall be in accordance with approved submittals.

H. Submit shop drawings and product data as a complete set within thirty (30) days of award of contract.

I. For initial submission and for re-submission required for approval, submit one (1) electronic copy of each item. Make reproductions as required for your use and distribution to subcontractors. Reproduction of documents will be at contractor's expense. Illegible submittals will not be checked by the engineer.

J. General: Submit the following:

1. Bill of materials, noting long lead time items
2. Project schedule including all major work components that materially affect any other work on the project

K. Shop drawings: Submit the following:

1. Backbone (riser) diagrams.
2. System block diagram, indicating interconnection between system components and subsystems.

L. Product Data -- Provide catalog cut sheets and information for the following:

1. Wire/Cable.
2. Outlets, jacks, faceplates, and connectors.
3. Terminal blocks and patch panels.
4. Enclosures, racks, and equipment housings.

5. Over-voltage protectors.

6. Splice housings.
7. Fiber optic cable

1.6 QUALITY ASSURANCE

A. Commscope cabling systems, Hubbell Premise Wiring Cat 6 Cabling, and Com Tran Cable - Signamax connectivity are approved for the work of this section.

B. The contractor shall be an authorized Manufacturer's cabling system contractor.

C. The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size and be currently operating service organization within 50 miles of project site.

D. Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.

E. Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the owner and engineer/designer.

1.7 WARRANTY

A. Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship, of all cabling system components, for a period of not less than twenty-five (25) years from date of acceptance by the owner.

B. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Final payment shall not relieve contractor of these obligations.

C. Installation costs including all necessary materials, cables, closures, bridging clips, splice materials, and terminations are to be the responsibility of the Contractor.

D. Installer Qualifications:

1. The Data Cable System Installer shall be licensed and shall meet all applicable regulations of the local and state authorities insofar as they apply to this type of system. The proposer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten (10) large-scale projects and contact names confirming successful Category 6 premises wiring system installations.
2. The Installer shall be a local area, integrator of the manufacturer's product and must provide the manufacturer's maximum available warranty on the entire system. The contractor's certification must have been obtained and held within 75 miles of the project's location.
3. The installing contractor must have a full-time employed RCDD (Registered Communications Distribution Designer) on staff. Current RCDD certification shall be provided in the product submittals.
4. All individuals must be employees of the certified installer and at least 25% of the installing staff shall have undergone a training class given by the manufacturer. Current certification indicating the successful completion of the training course shall

be available upon request at the project and submitted in the contractor's product submittals.

PART 2 - PRODUCTS

2.1 MATERIAL SPECIFICATIONS

A. Inside Unshielded Twisted Pair (UTP)

1. All unshielded twisted pair requirements for use shall meet EIA Category 6 specifications (plenum rated when installed in plenum spaces).
   a. NEC
   b. UL
   c. ANSI/ICEA Publication S-80-576
   d. EIA/TLA 568, 569, 570, 606, TSB 36, TSB 40
2. Multi-pair Riser Cables
   a. Cables from the MDF shall be further distributed to each of the other closets and terminated on 110 block in the IDFs there. The intra-building inter-IDF cables shall be of the multi-pair type, conforming to or exceeding the following EMMA 568 physical specifications of CAT 6 physical specification.
3. UTP Patch Cords
   a. EIA Category 6 UTP patch cords (8' in length) shall be supplied at each wall outlet for each jack installed. At the MDF's and IDF's, patch cords shall be terminated at both ends in 4-pair Type 110 or equivalent connectors for plugging onto the type 110 or equivalent cross-connect panels, IDFs and MDFs. The other patch cords shall be terminated in 8 position modular male connectors at both ends conforming to FCC Part 68 Rules, Subpart F. The ends shall be wired in accordance with EIA/TIA 568B.
4. UTP Termination Wall Plates
   a. The four-pair horizontal cables shall be terminated on 6-position modular duplex (two) outlets meeting EIA specifications for EIA Category 6 UTP and configured in compliance with T56B. The outlets shall be in compliance with FCC Part 68 Rules, Subpart F. The outlets with integrated or separate cover plates shall be installed in single standard electrical wall boxes. The data termination shall allow keyed connectors. The termination of wires shall be by the insulation displacement method equivalent to type 110 and shall require the use of the same punch down tool as the UTP termination blocks specified below.
   b. Jacks shall allow the insertion of 4 and 6 pin plugs as well as 8 pin plugs or RG6 - Coax connectors. Metal faceplates specified for all wiring devices. Each faceplate shall have provisions for inserting colored tabs to provide use identification for each jack
5. UTP TERMINATION BLOCKS
   a. At the MDF and IDF closets, all UTP cables shall be terminated on rack mounted two (2) "U" 48 -port patch panels and terminating blocks meeting EIA/TIA 568 specifications for EIA Category 6 UTP. These terminating blocks shall be used for MDFS, IDFs and all UTP cross-connect requirements. They shall allow termination of cables as well as the capability of connecting pre-assembled single pair and composite 4-pair patch cords. Termination blocks to be used for terminating outside plant cables shall be equipped with gas discharge protection units.
   b. The blocks shall be equipped with designation strips and color coded for terminating sets of four pairs of wires in accordance with ICEA specifications.

c. Cable tie wraps shall be included to neatly route, store and organize the termination cables.

6. INSIDE FIBER
   a. All fiber optic cables shall comply with the FDDI specifications published in ANSI Standard. The cables shall also comply with EIA and the FOTP specifications. The fibers in the cable shall conform to the industry standard color coding as specified by EIA. The outer jacket shall have markings indicating that it is a fiber optic cable. Other markings shall be core size and mode.
   b. Unless specified otherwise, all fiber optic cables shall be a minimum of twelve (12) strands.
   c. Fiber optic cable shall be tight-buffered riser cable, single-mode, OS 2, complete with flame retardant jacket.
   d. Cables shall be NEC OFNR listed and compliant to UL-1666, CSA FT-4, and ICEA S-83-596 standards.
7. FIBER CONNECTORS
   a. All fiber optic cables shall be terminated on connectors installed on rack mounted patch panels. The connectors shall be of the Type LC as defined in the EIA 568 or ANSI FDDI standards, constructed of ceramic or metal/ceramic materials. Plastic connectors shall not be used.
   b. The connector design shall incorporate strain relief such that it can withstand pulling, bending or twisting of the cable during installation and removal without affecting its operating characteristics.
   c. The connectors shall conform to all applicable EIA specifications for attenuation, durability, tensile strength, thermal shock, temperature cycling, humidity, impact, etc.
   d. Provide and install all fiber patch cords complete with LC connectors at both ends. Patch cords shall be 3-meters in length.
8. TYPE LC TERMINATING OUTLETS
   a. The connectors and adapters shall conform to specifications as outlined for connectors.
9. FIBER OPTIC SPLICES
   a. All fiber optic cables shall be installed in continuous lengths without splices. If splicing is required for extra-long distances, the splices shall be constructed by fusion and offer an attenuation of no more than 0.2 dB per splice. Mechanical splices are not permitted. All splices shall be stored neatly in splice boxes that allow easy access for maintenance and testing.
10. FIBER TERMINATION PANELS AND ADAPTERS
   a. The fiber optic cables shall be terminated in Type LC connectors. The terminated fibers shall be inserted in Type LC or equivalent fiber optic couplings /adapters/barrels mounted on rack mounted termination panels/enclosures. The panels shall be of metal construction with the capability of neatly storing excess fiber lengths and providing protection from dust and dirt. The panels shall allow ease of access to and maintenance of fibers.
   b. The panels shall allow cables to be installed and stored such that they do not alter the attenuation of the cables (as may happen when the fibers are tightly coiled, or the fiber is excessively bent at the connector strain relief). The adapters shall be metal, of the same manufacture as the connectors and shall introduce a loss of no more than 0.1 dB when two connectors are installed in it.
11. UTP CABLES AND PATCH CORDS COLOR CODING
   a. Wireless access points - white.
   b. All other ethernet - blue.

PART 3 - EXECUTION

3.1 PAIR IDENTIFICATION

A. The following room recording procedure shall be completed after each wire or cable has been pulled:

1. Terminations: Telephone station cables, CATV station cables and data station cables shall be tagged at backboards with cable tags indicating telephone or data and marked with room number to which it is connected. In rooms where more than one jack exists, the jacks are to be numbered sequentially and indicated on the cable tag. The outlet number shall also be indicated on the faceplate of the jack.
   a. Each pair terminated shall be legibly labeled on the terminal blocks according to the room number and jack with which it is associated.
   b. Each station wire shall be plainly marked at its backboard end with the room number to which it is connected and terminated on the Type 110 termination blocks.
   c. All cables will be legibly and permanently numbered at each end. String tags are not acceptable.

3.2 CROSS CONNECTIONS

A. At the backboards, Contractor shall cross connect all pairs from each station cable designated for telephone and/or data use to an incoming pair of the riser cable designated for telephone and/or data use. The cross connection of these pairs should provide four (4) continuous pair from each data outlet and one (1) continuous blue/white pair from each telephone located on that floor. Contractor shall label each pair on the Type 110 terminal according to the numbering scheme.

3.3 MDF LAYOUT AND CABLE DISTRIBUTION

A. The MDF and IDF are constructed of a combination of a backboard on which shall be mounted to type 110 cross-connect blocks and 4-post rack. Provide a minimum of ten feet spare cable for each run coiled on wall (see detail).

3.4 UTP NETWORK

A. The UTP network consist of the following elements:

1. Outside Plant
2. Inside Plant - Riser and Horizontal
3. MDFs
4. IDFs
5. Wall Plates
6. Patch Cables

3.5 CABLE INSTALLATION

A. The contractor shall optimize cable utilization by designing splice points. All cable splices and cable routed through manholes shall be supported on cable racks.

3.6 INSIDE

A. The cables in the risers and closets shall be neatly bundled and tie wrapped. Cable trays shall be provided and installed where necessary, especially between the backboards and equipment racks, and the backboard and the horizontal pathways. Cables traversing the vertical paths shall be anchored to the wall. The method and means of running horizontal cable distribution will vary. Each duplex wall outlet shall have a conduit that runs in the wall from that outlet to the wire closet. Thus, the 4-pair horizontal cable runs shall emanate at the wall outlets, run along the wall conduit, and terminate at the voice or data patch panel in the wire closet.

B. All cables shall be labeled and color coded in accordance with the EIA 606 standard.

3.7 HORIZONTAL RUNS

A. The wall outlets are of three types: voice, data, and CATV. The voice outlets shall be connected to the voice cross-connect panels in the wire closets. The data outlets are identified by the keyed slot, and they shall be connected to the data cross-connect panels in the wire closets. The voice and data cross- connect panels are so identified on the closet drawings. The wall outlets shall be wired in accordance with EIA T568B configuration. At each wall outlet, 18 inches of wire shall be allowed spare for future changes.

B. Since the cables to be terminated shall be of EIA Category 6 quality, all terminations shall ensure minimum of untwisting at the connections. The length of wire shall be untwisted only to the extent necessary for making the connection. Both the cross-connect panels and the wall outlets are of type 110. These allow the twists to be maintained to the point of termination. Also, the cable slots between the index strips provide space to maintain cable shield to the point of termination.

C. All terminations on the cross-connect panels shall be labeled and color coded in accordance with industry standards as specified by EIA. All terminations, cables and panels shall be identified and labeled in accordance with EIA 606.

3.8 RISER CABLES

A. The individual cable wires shall be installed in accordance with the method and color coding described under Installation and Test Instructions.

B. The terminations on the central IDF shall be identified to indicate the MDF connections and the floor connections, both with their own sequential numbering scheme that corresponds with the other end of the cable and also indicated at the location of the other end of the cable. The terminations on the individual floor IDFs shall identify the position on the MDF.

3.9 TESTING

A. All conductors in every cable shall be tested end-to-end to prove that they meet the cable specifications described in EIA standards and this document. The tests shall be conducted in the presence of a Telecommunications Specialist. All tests shall be completed first before any corrective action is taken. Corrected conductors shall be tested again. The Telecommunications Specialist reserves the right to request that the conductors passing the previous tests be tested again after corrective action has been taken on the faulty conductors. Conductors not passing the tests shall also be documented together with the corrective action taken. Test results shall be documented and supplied before the installation is considered for acceptance.

B. The following tests shall be conducted as a minimum:

1. Compliance with color coding
2. Tip and ring polarity
3. Neatness of cable routing and tie downs
4. Continuity
5. Shorts, grounds and opens
6. Crosses (shorts to other pairs)
7. Rolls (reversed polarity)
8. Splits

3.10 ACCEPTANCE TESTING

A. When the Contractor has completed all cable installation and termination, and he is ready for testing, he shall inform the Architect/Engineer of the intent. The Architect/Engineer shall assign the Telecommunications Specialist who shall monitor the Contractor testing. The Architect/Engineer has the authority to accept or reject any test and request, and, at his discretion, complete retesting of any portion of the plant if there are an unreasonable number of pairs not passing tests indicated above. The Architect/Engineer may request the Contractor to replace any portion of the plant if the tests indicate faulty or improper installation, or numerous repairs are necessary to pass the tests. The plant shall be accepted by the Architect/Engineer after the Contractor has demonstrated that all the pairs have passed all the tests, all the tests have been documented, the plant is labeled and recorded, and all plant records have been provided in accordance with the requirements of the Documentation Sub-Section later in this document. The Contractor shall comply with any and all warranties required by the general contract agreement with the Architect/Engineer.

3.11 RECEIVING FIBER OPTIC CABLES

A. Before commencing installation, the Contractor shall inspect and test the cables on the reel. The reels shall be accompanied by manufacturer's test report for that particular glass strand and cable indicating such parameters as the attenuation and bandwidth. The Contractor shall at a minimum perform attenuation, break/kink and length verification tests on each strand on the reel with the aid of an OTDR. A printout of the test for each fiber shall be generated and submitted for records. A five-foot section of the cable shall be stripped back and inspected for consistency of manufacture of the jacket, buffer, plastic coating, etc. An inspection and test report shall be provided. Installation shall only proceed after the test documentation has been submitted and the cables have been accepted for installation by a telecommunication specialist.

3.12 INSTALLATION OF FIBER OPTIC CABLES

A. The installation plan shall describe the approach that the Contractor plans to take in installing the fiber optic cables. Some of the typical factors are:

1. Supervisory and technical staff contingent and qualifications
2. Testing the ducts before installation
3. Use of mechanical devices
4. Pulling Force
5. Manhole organization - laying on cable racks and loops of extra cable, etc.

B. All outside fiber optic cables shall be installed in inner ducts and prominently labeled with "caution, glass fiber cables" or equivalent, at six-foot intervals wherever the cables are exposed to view. Inside cables shall be installed in inner ducts only where installation is in conduits. Open trays do not require inner ducts. Unwound cables shall be placed in figure 8

configurations when they are not on the reels. When a cable is installed, the pulling tension shall be minimal, less than the manufacturer's recommended tension. The cable on the reel shall be unwound such that there is no tension on the cable. The cable shall either be unwound manually, or by any mechanical means that turns the wheel as opposed to pulling the cable. The cable shall be hand-fed over or around any curves, bends or edges without scrapes or bends in the cable. Strain reliefs or supports shall be provided where necessary, such as in manholes or vertical risers.

C. At each end of the cable a minimum of ten feet of service loop cable shall be allowed for termination and future use. All excess cable shall be neatly stored out of harm's way.

3.13 TERMINATIONS OF FIBER OPTIC CABLE

A. Both single mode and multi-mode-cables are to be installed. Both these types of cables shall be terminated in LC type connectors. However, the two cable types shall be connected on separate fiber patch panels. Proper procedures shall be followed and the right tools used for terminating the fibers in the connectors. Below are examples of precautions and procedures which shall be conformed to:

1. The tool used for stripping the fiber shall conform to the size of the fiber being stripped and shall leave no nicks on the fiber; the stripping shall be effortless and, for example, not require looping of the fiber around the finger for gripping.
2. If crimping is required, the appropriate size apertures on the tool shall be selected.
3. The jacket material remaining after stripping shall be removed by dissolving in chemicals and not by scraping.
4. If the connector required adhesives or epoxy for fastening the fiber to the connector, the material shall be injected in the connector such that it oozes out, displacing all the air from the space to be occupied by the fiber.
5. While seating the fiber in the adhesive filled connector, no air bubbles shall be introduced, such as by inserting and re-inserting the fiber. The fiber protruding from the connector ferrule shall have a small bead formed at its base.
6. The scribe tool used for preparing the excess fiber for removal shall be of high quality and sharp so as not to shatter the glass fiber. The scribed fiber shall be pulled rather than snapped.
7. Heat guns or hot-air blowers shall not be used for curing.
8. Heat shrink tubing shall not be used.
9. A minimum of three types of polishing paper shall be used (changing them often).
10. Polishing shall be performed using the figure 8 routine, creating a spherical polished end profile; a recessed profile shall be rejected.
11. The quality of the polish end shall be inspected using a microscope with a minimum magnification of 200x.
12. All finished terminations shall be covered with boots at all times; similarly, all adapters shall also be covered with boots.
13. Strands of fiber from loose tube cables shall be sheathed in protective fan-out tubing or spiral from the point the fiber leaves the cable to the point where it is terminated on a connector. All gel or waterproofing compounds shall have been cleaned off.
14. The terminations shall be sequentially numbered in synchronization with the color code. The terminations and cables shall be labeled to clearly describe the location at the other end.

3.14 TESTING OF FIBER OPTIC CABLE

A. All tests shall be conducted at 1300 mn.

B. The cable shall be tested on the reels with the OTDR before beginning installation.

C. The fibers shall be tested with the OTDR after the cables have been pulled and the ends dressed for termination. A paper trace of the test shall be provided for each fiber. Evidence of kinked or otherwise damaged fibers shall be cause for replacement of the entire cable.

D. Termination of the fiber on connectors shall only commence after OTDR traces have been approved by the Architect/Engineer and the cable accepted for termination. The terminated fibers shall be tested using the power meter. The OTDR - and power meter tests shall be performed from both ends using calibrated adapters and connectors.

E. Reference measurements of the power receivers shall be checked frequently. Any deviation of 0.1 dB or more shall be cause for retesting the fibers that were tested with that reference.

F. All test equipment, especially the OTDR and the power meter shall have been calibrated by the manufacturer or an accredited test facility within six months prior to beginning the tests on site.

G. Acceptance Testing. When the Contractor has completed all cable installation and termination, and he is ready for testing, he shall inform the Contracting Officer of the intent. The Contracting Officer has the authority to accept or reject any test and request, and at his discretion, complete retesting of any portion of the plant if there are an unreasonable number of fibers not passing tests indicated above. The Contracting Officer may request the Contractor to replace any portion of the plant if the tests indicate faulty or improper installation, or excessive re-work is necessary to pass the tests. The plant shall be accepted by the Contracting Officer after the Contractor has demonstrated that all the fibers have passed all the tests, all the tests have been documented, the plant is labeled and recorded, and all plant records have been provided in accordance with the requirements of Documentation, Section 3.4 later in this document. The Contractor shall comply with any and all warranties required by the general contract agreement with the Contracting Officer.

3.15 GROUNDING

A. The buildings shall be equipped with central point grounding schemes. A master ground bar shall be installed at the MDF. Ground window bars shall be installed at the IDF in every other closet. All cables with metallic elements and all metallic hardware shall be grounded in accordance with REA Section 810 and EIAMA PN-2327 grounding specifications for telecommunications.

3.16 DOCUMENTATION

A. The Contractor shall provide two sets of documents. One set shall provide a record of all the tests conducted on cables, terminations, etc. Another set shall depict all the telecommunications wiring and cabling installation, within and to the building.

3.17 TEST DOCUMENTATION

A. Test records shall be provided for the following tests:

1. UTP, Terminations
    a. Manufacturing test results
    b. Outside plant cables
    c. Riser cables
    d. Horizontal cables
2. Fiber
    a. Manufacturing test results

b. Outside plant fibers - OTDR before and after installation
c. Fiber terminations - power meter tests

3.18 RECORD DOCUMENTATION

A. After all installations have been completed and tested, the Contractor shall provide records of the installation in accordance with EIA/TIA Standard 606. The records shall be required in hard copy format printed from a software such as Cable Management Systems by Microtest (CMS). CMS is a commercially available off-the-shelf software designed specifically for cable installation records. The Contractor shall supply the software and the records using the software to one FWS technician.

B. As described in the EIA standard, the following types of records shall be supplied:
1. Fiber, voice and data terminations located in work areas, telecommunications closets, equipment rooms and entrance facilities.
2. Telecommunications media between terminals (horizontal distribution).
3. Pathways between terminations that contain the media.
4. Spaces where terminations are located.
5. Bonding/grounding as it applies to telecommunications.

C. All the elements of the telecommunications infrastructure shall be identified and labeled by a code. The coding method to be used shall be as specified in the EIA 66 standard. On the following page is a representative list reproduced from the standard (xxx denotes a numerical designation).

CODE	DESCRIPTION
BCxxx	Bonding Conductor
BCDxxx	Backbone Conduit
Cxxx	Cable
CBxxx	Backbone Cable
CDxxx	Conduit
CTxxx	Cable Tray
ECxxx	Equipment (bonding) conductor
EFxxx	Entrance Facility
ERxxx	Equipment Room
Fxxx	Fiber
HHxxx	Hand Hole
ICxxx	Intermediate Cross-Connect (IDF)
Jxxx	Jack (Outlet)
MCxxx	Main-Cross-connect (MDF)
MHxx	Man hole or maintenance hole

PHxxx	Pull Box
Sxxx	Splice
SExxx	Service Entrance
SLxxx	Sleeve
TCxxx	Telecommunications Closet
TGBxxx	Telecommunications grounding busbar
TMGB	Telecommunications main grounding busbar
WAxxx	Work Area

3.19 MAINTENANCE CONSIDERATIONS

A. The cable installation shall be installed to maximize the safety, maintainability, and performance effectiveness of maintenance personnel, and shall minimize demands upon skills, training and manpower. Splices/terminations shall be placed and supported so as to maximize the efficiency and ease with which it can be maintained and shall ensure accessibility.

3.20 CABLE TESTS

A. Contractor shall perform testing of all pairs for each cable installed as directed by these specifications. Post construction cable acceptance tests consist of conductor continuity tests, and conductor insulation resistance tests. These tests assure that the cable has been terminated properly and has not been damaged during construction. An Owner's representative will be required to witness these tests.

B. Each cable pair shall be tested for shorts (T to R and T&R to ground), continuity, and loop resistance. Maximum loop resistance from the main telephone/data panel to each jack shall be within 5% of the calculated value based on the actual length of cable installed, and the loop ohms/1000 ft. for copper conductors.

3.21 DEFECTIVE CABLE PAIRS

A. The vendor shall test all cable pairs and shall record, on the pair assignment record, the nature of the defect for each pair found to be defective and remedies used to clear the defect. In order for the cable distribution system to be considered acceptable, there shall be no defective pairs in any cable. Any cable having defective pairs shall not be used and shall be replaced at Contractor's expense.

3.22 INSPECTIONS

A. Routine on-site construction inspections by the Architect/Engineer and/or an Owner's representative will involve trips to the complex to inspect construction, so as to assure adherence to standard construction practices. The number of such inspections will be at the Architect/Engineer's discretion.

3.23 ACCEPTANCE

A. The project shall be considered acceptable based upon the following:

1. Contractor has furnished and installed all equipment and materials and performed all work in accordance with these specifications.
2. Contractor has successfully completed all the required testing assuring compliance with the required specifications.
3. Contractor has removed all trash and debris by contractor from the area and restored site to original condition.
4. Contractor has submitted the required documentation to state officials.

END OF SECTION 28 05 13

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, and pavements.
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks and pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 033000 “Cast-in-Place Concrete”
2. Section 321313 “Concrete Paving”

1.3 UNIT PRICES

A. Contractor is to provide (separate) unit (cubic yard) pricing for excavation and disposal of material and installation and compaction of imported satisfactory material.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe. Commercially available as “610 Roadbase”.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation or contract time.

E. Fill: Soil materials used to raise existing grades.

F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

G. Subbase Course: Aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete walk. Commercially available as “610 Roadbase”.

H. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase or topsoil materials.

I. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.

B. Material Test Reports: For each soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 698.
3. For material proposed for treatment, provide material test reports prior to treatment.

C. Lime Treatment Material

1. Product information
2. Proposed application rate (i.e. – depth and quantity)

D. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

E. Photographic documentation positively identifying depth of excavation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

1.7 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.8 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify utility locator service Louisiana One Call for area where Project is located before beginning earth-moving operations. If a SUE (subsurface utility engineering) survey has been performed for the project site, Contractor shall use this to assist with locating and avoiding subsurface improvements that are to remain or otherwise to be protected.

C. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials.

B. Satisfactory Soils: Lime-treated silty or sandy clay free of debris, waste, vegetation, and other deleterious matter.

1. Liquid Limit: 55 max prior to treatment, 30-42 after treatment
2. Plasticity Index: 35 or less prior to treatment; 12-22 after treatment

3. Lime Treatment:

a. Lime treatment material shall be either hydrated lime or granular quicklime conforming to ASTM C 977.
b. Application rate shall be 19 lbs of material (hydrated lime or granular quicklime) per square yard per 12” depth.

c. Properties, including soil properties prior to lime treatment, properties after lime treatment, and confirmation of lime application (i.e. – depth and quantity), shall be submitted for approval by Engineer prior to installation and shall be field verified by testing agency during mixing operations.
d. Lime treatment shall occur at the borrow pit – no on-site mixing will be permitted.

C. Engineer reserves the right to personally witness the lime application and, additionally, engage a testing agency of his own selection.

D. Unsatisfactory Soils: Any soils that do not satisfy the requirements for "Satisfactory Soils".

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content to at least 95% of the Standard Proctor maximum dry density at time of compaction.

E. Subbase Material and Bedding Course: Crushed stone conforming to the requirements of Section 1003.03.1 (stone) and 1003.03.2 (recycled Portland cement), of the Specifications in Part X of the Louisiana Standard Specifications for Roads and Bridges published by the Louisiana Department of Transportation and Development (LADOTD). Commercially available as "610 Roadbase".

F. Sand: ASTM C 33; fine aggregate.

2.2 GEOTEXTILES

A. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications.

1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

a. Mirafi 600X by Tencate
b. Geotex 315ST by Propex Geosolutions
c. Alternate products meeting or exceeding the specifications of the above products will be considered; submit prior to bid submission.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades. No modification of contract amount or time will be awarded for unanticipated dewatering efforts, or otherwise for damage (and any required repairs and testing) caused by a lack of proper dewatering.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

E. Damage to the site, including subgrade and fill, sand and aggregate material and installed products, that are a result of degradation by precipitation, insufficient dewatering efforts, construction traffic, etc. as determined by the Engineer, will be repaired by the contractor, with no modification of contract amount or time. Repair efforts may include, but are not limited to, tilling, windrowing, scarifying, and drying the site until a satisfactory moisture content is achieved.

3.3 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include soil materials and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials, replace with satisfactory soil materials.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells,

joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

3.7 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
3. Proof-roll shall not be performed with any vehicle other than a tandem-axle dump truck.
4. Engineer reserves the right waive witnessing of the proof-roll and can direct testing agency to perform witnessing on his behalf.
5. Testing agency is not authorized to fail a proof-roll or otherwise provide any direction to the Contractor. Testing agency shall immediately contact the Engineer directly to discuss potentially unsatisfactory conditions observed during the proof-roll.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of satisfactory soil to a height of 12 inches over the pipe or conduit.

    a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Final Backfill:

1. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. "Bench" site as required to achieve slope this condition.

B. Place and compact fill material in layers to required elevations.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SUBGRADE, SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than 95 percent of maximum dry unit weight according to ASTM D 698. Compact bedding and backfill materials at utility trenches to not less than 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends. Prior to beginning installation, grade area to be covered smooth, remove any foreign materials and lumps of soil that would contaminate subbase course or interfere with installation of the geotextile.
2. Shape subbase course to required crown elevations and cross-slope grades.
3. Place subbase course 6 inches or less in compacted thickness in a single layer.
4. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
5. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 90 percent of maximum dry unit weight according to ASTM D 698.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of subbase and soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Trench Backfill: At each compacted bedding, initial backfill layer, and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.

D. Testing agency will positively identify and photographically document depths of excavations following satisfactory proof-roll and prior to installation of backfill.

E. Testing agency will positively identify and document thicknesses of layers of backfill and fill prior to compaction.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 313116 – TERMITE CONTROL

PART 1 - GENERAL

1.1 CODES

A. Architect shall take approval action on required submittal data for proposed products and qualifications of applicator.

B. Conform to applicable code for requirements for application, application licensing, and authority to use toxicant chemicals in accordance with EPA.

C. EPA - Environmental Protection Agency - Federal Insecticide, Fungicide & Rodenticide Act.

1.2 COORDINATION

A. Applicator shall be state licensed.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.3 INSTALLATION

A. Install termiticide products at the application rate recommended by the manufacturer.

B. Install termiticide products in strict accordance with the manufacturer's installation instructions.

1.4 REPORTING REQUIREMENTS

A. Comply with Regulatory Agencies for requirements regarding documentation and reporting of application of Termiticides.

B. Test Reports: Initiate and file regulatory agency approval reports when required.

1.5 APPLICATION LOCATIONS

A. Soil treatment for termite control below grade and foundation perimeter.

B. Under slabs-on-grade at building.

C. Soil within 10 ft. of building perimeter, <u>after completion of construction and final grading/contouring around the building.</u>

D. Install application ports at locations where paving is installed adjacent to the building

1.6 INSTALLER REQUIREMENTS

A. Applicator shall be state licensed.

B. Installer shall be secured with a bond by a Louisiana-licensed Surety.

1.7 WARRANTY

A. 5-years non-pro-rated from the Date of Substantial Completion (not the application date) against infestation and/or termite damage.

B. Limits of Warranty coverage shall be 10% of the project construction cost or $150,000.00, whichever is less, for damages to building and contents. Warranty shall include coverage for damage and repairs to the building, as well as replacement of any building contents due to damage caused by termites.

C. If evidence of termites occurs within warranty period, all direct and indirect damage, including incidental damages shall be repaired, and areas shall be retreated, at no cost to the Owner.

D. Installer shall make Annual Inspections of the Exterior and Interior of the building, and shall issue a written report to the Owner of any findings (or of the lack thereof).

E. Include optional renewal policy on an annual basis after fifth year; fee shall be equitable and agreed upon by applicator and the Owner.

END OF SECTION 313116

SECTION 321220 –BASE COURSE AGGREGATES

PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Crushed limestone and concrete
2. Geotextile separation fabric

B. Related Requirements:

1. Section 033000 Cast-in-Place Concrete
2. Section 072600 Vapor Retarders
3. Section 31200 Earth Moving
4. Section 321313 Concrete Paving

1.2 REFERENCES

A. LA DOTD (Louisiana Department of Transportation and Development)

1. 2016 Standard Specifications for Roads and Bridges Manual

1.3 ACTION SUBMITTALS

A. Product Data:

1. Geotextiles, including manufacturer's written instructions.

B. Material Test Reports

1. Documentation indicating product and gradation satisfy the requirements of LA DOTD Section 1003.03.1 "STONE" and/or Section 1003.03.2 "RECYCLED PORTLAND CEMENT CONCRETE".
2. Optimum Moisture Content as per ASTM D 698.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

1.5 FIELD CONDITIONS

A. Proceed only when all proceeding work, including but not limited to subgrade preparation and earthwork, have been completed satisfactorily.

PART 2 - PRODUCTS

2.1 CRUSHED STONE AND CRUSHED RECYCLED PORTLAND CEMENT CONCRETE

A. LA DOTD Section 1003.03.1 “STONE“ and/or Section 1003.03.2 “RECYCLED PORTLAND CEMENT CONCRETE”. Available commercially as “610 Roadbase”

2.2 SEPARATION GEOTEXTILE

A. Products are limited to the following:

1. Mirafi 600X by Tencate
2. Geotex 315ST by Propex Geosolutions
3. No substitutions

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that the subgrade and/or fill material is approved by Engineer.

3.2 INSTALLATION

A. Separation Geotextile

1. Grade area to be covered smooth; remove any foreign materials and lumps of soil that would contaminate the base course or interfere with the installation of the geotextile fabric.
2. Install geotextile separation fabric in strict accordance with manufacturers written instructions.

B. Crushed Stone / Concrete

1. After fabric is in place, install crushed limestone in six inch (maximum) lifts and in accordance with applicable portions of Section 312000 “Earth Moving.” Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 90 percent of maximum dry unit weight according to ASTM D 698. Grade smooth and roll after each lift is installed.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will Engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test each lift. Testing agency to document:

1. Thickness of lifts
2. Compaction of material as per ASTM D 698

3.4 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus and waste materials and legally dispose of them off Owner's property.

END OF SECTION 321220

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes Concrete Paving, including the Following:

1. Driveways.
2. Parking lots.
3. Curbs and gutters.
4. Walks.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete"
2. Section 031200 “Earth Moving”
3. Section 321373 "Concrete Paving Joint Sealants"
4. Section 321723 "Pavement Markings."

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including reinforcement support products.

B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Reinforcement Fabrication Drawings: For all areas of paving. Include plans and details of sufficient development to accurately and clearly convey the size, length, geometry and

location of each individual piece or rebar. Notes added to the construction documents are not acceptable and will be rejected without review.

E. Joint Materials: For each type of joint.

F. Concrete Parking Bumpers and fastener

G. Tactile warning surfaces

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

B. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

D. \Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

B. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

1.8 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. Concrete is not to be placed is temperature is below or expected to fall below 40 deg F. Place concrete only when temperature is 40 deg F or higher and rising.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms**,** steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.

C. Reinforcing Bars: ASTM A615, Grade 60; deformed.

D. Steel Bar Mats: ASTM A184; with ASTM A615, Grade 60 deformed bars; assembled with clips.

E. Plain-Steel Wire: ASTM A1064, as drawn.

F. Deformed-Steel Wire: ASTM A1064.

G. Joint Dowel Bars: ASTM A615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

H. Tie Bars: ASTM A615, Grade 60; deformed.

I. Hook Bolts: ASTM A307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2. Support dowels at contraction joints with a dowel basket type product; dowels are not to be supported by welded wire fabric.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150, gray portland cement, Type I/II.
2. Fly Ash: ASTM C618, Class F. The use fly ash is an option, not a requirement.
3. Slag cement is not permitted.

B. Normal-Weight Aggregates: ASTM C33, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

E. Water: Potable and complying with ASTM C94.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

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 Corporation.
b. Dayton Superior.
c. Euclid Chemical Company (The); an RPM company.
d. Sika Corporation.

E. Resin Based, Water Emulsion Concrete Curing Compound: ASTM C309, Type 1, Classes A&B, dissipating.

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. Basis of Design - W.R. Meadows 1100, Clear
b. Substitutions will be permitted.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D 8139 and ASTM D 1751; semi-rigid, closed-cell polypropylene joint filler. ¾" width; depth established by paving profile.

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. Basis of Design – Nomaflex
b. Substitutions will be permitted

B. Joint Keyways: 24 Gauge, galvanized material with removable cap for installation of joint filler.

C. Bonding Agent: ASTM C105, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy-Bonding Adhesive: ASTM C881, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types I and II, non load-bearing and Types IV and V, load-bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 STAMPED DETECTABLE WARNING MATERIALS

A. Detectable Warning Stamp: Semirigid polyurethane mats with formed underside capable of imprinting detectable warning pattern on plastic concrete; perforated with a vent hole at each dome.

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. ADA Solutions, Inc.
b. Advanced Surfaces Inc.
c. Butterfield Color, Inc.
d. Stampcrete International, Ltd.
e. Transpo Industries, Inc.

2. Size of Stamp: One piece, matching detectable warning area shown on Drawings.

B. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.

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. Advanced Surfaces Inc.
b. Butterfield Color, Inc.
c. Stampcrete International, Ltd.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 211.1 and ACI 301 for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 15 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 5 percent plus or minus 1-1/2 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture; high-range, water-reducing admixture; high-range, water-reducing and retarding admixture; and plasticizing and retarding admixture in concrete as required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 3000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.50.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. “Performance” type mixes with variations to item 2 and 3 (only) will be considered if submitted with appropriate data and testing results.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.10 CONCRETE PARKING BUMPERS

A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 2500-psi minimum compressive strength, approximately 6 inches high by 9 inches wide by 84 inches. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
2. Mounting Hardware: Galvanized-steel spike or dowel, 3/4-inch diameter, 10-inch minimum length or hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding. Conform to requirements in Section 31200 “Earth Moving”.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck.
3. Testing agency representative is not authorized to fail a proof-roll. Contractor is to contact Engineer for direction if apparent sub-standard conditions are encountered.
4. Correct subbase with soft spots and areas of excessive pumping or rutting according to requirements in Section 312000 "Earth Moving." Engineer’s prior written approval required for any and all excavations in excess of the contract amount. Remedial work to unapproved excavations will be at no additional cost to the owner.

C. Install fill, geotextile separation and subbase course according to requirements in Section 31200 “Earth Moving” and Section 32120 “Crushed Aggregate Base”.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

2. Wood materials will not be permitted for use as any type of joint and any construction using wood material at joints of any type will be rejected outright.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

2. Butt Joints: Use epoxy-bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. Use only where indicated or otherwise at specific written direction from Engineer.
3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 80 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Doweled Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Dowels: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut minimum 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

    a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.

    b. Saw-cutting of joints is to commence within four (4) hours of the completion of finishing activities and continue uninterrupted to completion. It is the Contractor's sole responsibility to ensure these joints are installed in a timely manner. Defective conditions, as determined by the Engineer, resulting from untimely installation of the joints will be rejected and will be repaired and/or replaced by the Contractor at no additional cost to the owner.

    c. Provide additional / wider cutting as required for installation of joint sealant.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 DETECTABLE WARNING INSTALLATION

A. Cast-in-Place Detectable Warning Tiles: Form blockouts in concrete for installation of tiles specified in Section 321726 "Tactile Warning Surfacing." Screed surface of concrete where tiles are to be installed to elevation, so that edges of installed tiles will be flush with surrounding concrete paving. Embed tiles in fresh concrete to comply with Section 321726 "Tactile Warning Surfacing" immediately after screeding concrete surface.

B. Stamped Detectable Warnings: Install stamped detectable warnings as part of a continuous concrete paving placement and according to stamp-mat manufacturer's written instructions.

1. Before using stamp mats, verify that the vent holes are unobstructed.
2. Apply liquid release agent to the concrete surface and the stamp mat.
3. Stamping: While initially finished concrete is plastic, accurately align and place stamp mats in sequence. Uniformly load, gently vibrate, and press mats into concrete to produce imprint pattern on concrete surface. Load and tamp mats directly perpendicular to the stamp-mat surface to prevent distortion in shape of domes. Press and tamp until mortar begins to come through all of the vent holes. Gently remove stamp mats.
4. Trimming: After 24 hours, cut off the tips of mortar formed by the vent holes.
5. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet long; unleveled straightedge not to exceed 1/2 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.11 PARKING BUMPERS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 5 inches into pavement.

B. Paint as required with specified paint or otherwise with paint compatible with parking bumper surface. Color to be selected by Architect.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. of concrete or 5000 sq. ft. of surface area of slab or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39; test one specimen at seven days and two specimens at 28 days; maintain one specimen in reserve.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.13 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Joint-sealant backer materials.
3. Primers.

B. Related Requirements:

1. Section 321313 “Concrete Paving”

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of joint sealant and accessory.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Source Limitations: Obtain sealants from a single manufacturer.

2.2 COLD-APPLIED JOINT SEALANTS

A. Self-leveling, One-Part Polyurethane Sealant: ASTM C-920, Type S.

1. Product: Subject to compliance with requirements, provide the following:

a. Basis of Design: Sikaflex-1c SL by Sika
b. Substitutions will be permitted.

2.3 JOINT-SEALANT BACKER MATERIALS

A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on 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.

3.3 INSTALLATION OF JOINT SEALANTS

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.

C. Install joint-sealant backings to support joint 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 joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

1. Place joint sealants so they fully contact 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 Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 321373

SECTION 329200 – HYDROSEEDING AND SODDING

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. Topsoil
2. Final Grading
3. Hydoseeding
4. Solid Sod

B. Related Sections include the following:

1. Section 022300 Site Clearing for topsoil stripping and stockpiling.
2. Section 023000 Earthwork for excavation, filling and backfilling, and rough grading.
3. Section 334100 Storm Utility Drainage Piping for subsurface drainage.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer whose work has resulted in successful lawn and plantings establishment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Hydroseed Lawns: Deliver at time of application only.

B. Solid Sod: Deliver on pallets, store in area as directed by General Contractor; maintain moisture levels of sod.

1.6 SCHEDULING

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

B. Do not undertake hydroseed operations when chance of rain is imminent within a 48 hour period after application.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

B. **Provide 3”-4” of topsoil over all areas disturbed by construction operations, and as indicated to receive solid sod or hydroseed.**

C. Topsoil Source: Import topsoil and/or re-use surface soil stockpiled from removal from site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

2.2 HYDROSEED

A. **At all areas affected by construction operations, and not indicated to receive Solid Sod, provide and install Hydroseed.**

B. **Solution of water, fertilizer, wood fiber, combination of St. Augustine Grass Seed + Rye Grass Seed (if applied in cool months), adhesive/binder, and dye.**

C. **Prior to installing Hydroseed, provide and install Topsoil, as described in Part 2.1, above.**

2.3 SOLID SOD

A. **Where indicated on drawings, provide and install Solid Sod.**

B. **Farm-grown, palletized St. Augustine sod squares. Provide sod with uniform density, color, and texture, strongly rooted and capable of vigorous growth when planted.**

C. **Prior to installing Hydroseed, provide and install Topsoil, as described in Part 2.1, above.**

2.4 PLANTING SOIL MIX

A. Topsoil mixed with a blend of bonemeal and commercial fertilizer.

2.5 PLANT MATERIALS

A. Shrubs and low-growth plants in metal or plastic nursery containers.

B. Groundcover plants and bedding plants in plastic trays (multiple or single).

C. Trees delivered in plastic nursery containers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out areas of lawns and planting beds and obtain approval from architect for layout; adjust areas as directed.

3.3 LAWN PREPARATION

A. Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

B. Finish Grading: Grade areas to be hydro-seeded or sod to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be hydroseeded or sod laid in the immediate future.

C. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. **Provide and install Topsoil, as described in Part 2.1, above.**

E. Restore areas if eroded or otherwise disturbed after finish grading and prior to hydroseeding operations; replace dead sod squares.

3.4 HYDROSEEDING

A. **Hydroseed areas indicated on the Drawings, plus any additional or adjacent areas disturbed, or otherwise affected by construction operations.**

B. **Prior to installation of hydroseeding, fill, level, and fine grade all areas to drain. If finish grade elevations are provided on the Drawings, grade areas to within 0.5" +/-, prior to installation.**

C. **Spray-apply for uniform coverage & sufficient density for full growth free of bare spots, voids, etc.**

D. **The Contractor shall maintain, water, and fertilize all hydroseeded areas until new grass is fully established.**

E. **Backfill and re-grade any areas affected by erosion or settlement, to result in a uniformly graded area.**

F. **Re-seed areas not exhibiting full coverage growth, washed away by runoff or otherwise barren.**

3.5 SOLID SOD

A. **Where indicated in the drawings, install Solid St. Augustine Sod.**

B. **Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.**

C. **Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod squares; do not stretch or overlap. Stagger sod strips or squares to offset joints in adjacent courses.**

D. **Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a uniformly smooth surface. Work sifted soil or fine sand between cracks of pieces of sod as required to maintain lawn continuity.**

E. **Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1½" below sod.**

3.6 SATISFACTORY LAWNS

A. Satisfactory Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are established and considered satisfactory by the Owner.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

3.8 LAWN MAINTENANCE

A. **Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than time required for vigorous growth to be noticeable and all bare or eroded areas are sustaining growth.**

B. **Maintain and establish lawn by watering, fertilizing, weeding, etc. Roll, regrade, and replant bare or eroded areas and re-hydroseed to produce a uniformly smooth lawn.**

C. **Watering: The Contractor shall provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.**

1. **Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.**
2. **Water lawn at a minimum rate of 1 inch per week.**

D. **Mow lawn as soon as top growth is tall enough to cut. Remove no more than 40 percent of grass-leaf growth in initial mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial mowing to obtain grass height of 2 to 3 inches.**

E. **Lawn Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.**

1. **Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.**
2. **Fertilizer mix to include herbicide to inhibit growth of weeds during initial growth period.**

END OF SECTION 329200

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Cleanouts
3. Drains
4. Catch basins.
5. Pipe outlets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Manufacturer’s product data and installation guidelines
2. Proposed details for each unique condition, including but not limited to:

    a. Pipe Joints details and proposed materials
    b. Penetration treatments at manholes and catch basins

B. Shop Drawings:

1. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle manholes according to manufacturer's written rigging instructions.

D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 26, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints. SDR 35 permitted at areas under green spaces (non-paved areas) only.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

B. Dual Wall Polypropylene Gravity Piping:

1. Pipe: ASTM F2881, ASTM D3212, with bell-and-spigot ends
2. Fittings: ASTM D2881 with bell ends
3. Gaskets: ASTM F477, installed by pipe manufacturer. ASTM C923 at manhole and catch basin connections.
4. Basis of Design: HP Storm Dual Wall Pipe. Substitutions will be permitted; submit for consideration seven (7) days prior to bid submission.

2.2 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A1064, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 1064, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

2.3 CATCH BASINS

A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
6. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum unless otherwise indicated.
2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.4 PIPE OUTLETS

A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

B. Riprap Basins: Broken, irregularly sized and shaped, graded stone in accordance with NSSGA's "Quarried Stone for Erosion and Sediment Control."

1. Average Size: NSSGA No. R-4, screen opening 3 inches.

C. Filter Stone: In accordance with NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent

practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
3. Install PP pipe according to ASTM D2321 and manufacturer’s installation guidelines.
4. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
2. Join PVC schedule 40 according to ASTM D 2855 for solvent-cemented joints
3. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
4. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.

B. Set frames and grates to elevations indicated.

3.5 STORMWATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

3.6 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.7 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.

2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    b. Option: Test plastic piping according to ASTM F 1417.
    c. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 334100