

Project Manual

St. Tammany Fire Protection District No. 1 New Fire Station & Headquarters Building



February 23, 2017

Project No. C16-0058



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St. Tammany Fire Protection District No. 1
1358 Corporate Square
Slidell, LA 70458

St. Tammany Fire Protection District No. 1 will be accepting sealed proposals for the construction of a 6,177 square foot New Fire Station located at 530 Robert Blvd, Slidell, LA 70458 and a 7,525 square foot New Headquarters Building located at 522 Robert Blvd, Slidell, LA 70458.

Those interested in submitting proposals may obtain drawings and specifications, upon deposit of \$ 400.00 at the St. Tammany Fire Protection District No. 1 Headquarters located at 1358 Corporate Square Drive, Slidell, LA 70458, or cduffaut@slidellfire.org for information.

Sealed bid proposals shall be marked "SEALED – NEW FIRE STATION & HEADQUARTERS BUILDING" and shall also contain the respondent's Louisiana Contractor's Name and License Number on the outside of the envelope. In accordance with La. R.S. 37:2163, the Contractor shall certify that he holds an active license. The contractor shall hold a Louisiana Contractor's license in Municipal & Public Works Construction and/or Building Construction.

In the case of an electronic bid proposal, a contractor may submit an authentic digital signature on the electronic bid proposal accompanied by the contractor's license number in order to meet the requirements of La. R.S. 37:2163. Except as otherwise provided in R.S. 37:2163, if the bid does not contain the contractor's certification and show the contractor's license number on the bid envelope, the bid shall be automatically rejected and shall be returned to the bidder marked "Rejected" and shall not be read aloud.

Proposals should be submitted to St. Tammany Fire Protection District No. 1 Headquarters, 1358 Corporate Square Drive, Slidell, LA 70458 no later than 4:00 pm, Thursday, March 23, 2017. Any proposal received after 4:00 pm will be returned unopened.

Proposals will be opened on March 23, 2017, at 4:00 pm at Fire District Headquarters, 1358 Corporate Square Drive, Slidell, LA 70458.

In accordance with La. R.S. 37:2163, the Contractor shall certify that he holds an active license under the provisions of La. R.S. 37:2163 and all architects, engineers, and awarding authorities shall place in their bid specifications the requirement.

There will be a pre-bid mandatory meeting held of all respondents at the jobsite at 522/530 Robert Blvd, Slidell, LA 70458 on Monday, March 13, 2017 at 9:00 am. All prime respondents must have an officer, principal, manager, or supervisor present during the entire duration of the pre-bid meeting.

The signature on the bid must be that of an authorized representative of the corporation, partnership or other legal entity, as defined by Louisiana Public Bid Law Revised Statute 38:2212.A(1)(c) which dictates parties authorized to submit bids for public contracts.

All required Certificates of Liability Insurance shall list the Fire District as an "additional insured".

All applicable Federal, State, Local laws, ordinance, and rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

All proposals, bids and applications are welcomed. The Fire District encourages participation by Minority, Women-Owned, and Disadvantaged Business Enterprise firms.

Deposits are refundable to bonafide prime respondents and will be 50% refundable to all others with return of complete and unmarked documents no later than 10 days after receipt of proposals.

INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINITIONS AND INTRODUCTION

- 1.1 The Bidding Documents and the Contract Documents include the following:
Advertisement for Bids, Instructions to Bidders, Bid Form, General Conditions of the Contract for Construction, AIA Document A 201, 2007 Edition, Supplementary General Conditions, Contract Between Owner and Contractor, AIA Document A 101, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a STIPULATED SUM, Performance and Payment Bond(s), Specifications Divisions 1 through 33, Drawings, and Addenda.
- 1.2 The Owner of the proposed work is
St. Tammany Fire Protection District No. 1
1358 Corporate Square Drive
Slidell, LA 70458
- 1.3 The title of work will be as indicated in the Advertisement for Bids.
- 1.4 All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A 201 or in other Contract Documents are hereby made a part of the Instructions to Bidders.
- 1.5 **Addenda** are written or graphic instruments issued by the Architect prior to the opening of bids which modify or interpret the Bidding Documents by additions, deletions, clarifications, corrections and prior approvals.
- 1.6 A **Bid** is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- 1.7 The **Base Bid** is the sum stated in the Bid for which the Bidder offers to perform the Work described as the Base Bid, to which Work may be added for sums stated in Alternate Bids.
- 1.8 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 the Work or change in materials or methods of construction described in the Bidding Documents is accepted.
- 1.9 A **unit price** is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services or a portion of the Work as described in the Bidding Documents.
- 1.10 A **Bidder** is a person or entity who submits a Bid.
- 1.11 A **Sub-bidder** is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.
- 1.12 **Architects and Engineers:** The Architect of record or his authorized representative, and the consulting Engineer(s) whose seal(s) occur on the Construction Documents will administer the construction contract.
- 1.13 **Bid Forms** can be found immediately following these instructions to bidders.
- 1.14 A **Unit Price** is an amount proposed by Bidder and stated on the Bid Form as a price per unit of measurement for materials and/or services that shall be added or deducted from the contract sum by Change Order in the event the estimated quantities of work required by the Contract Documents are increased or decreased.

ARTICLE 2

BIDDER'S REPRESENTATION

- 2.1 The Bidder by making his Bid represents that:
 - 2.1.1 The Bidder has read and understands the Bidding Documents and his Bid is made in accordance therewith, and,
 - 2.1.2 The Bidder has visited the site(s) and has familiarized himself with all of the local conditions under which the Work is to be performed, and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents, and,
 - 2.1.3 The Bid is based upon the materials, systems, and equipment described in the Bidding Documents as advertised and as modified by Addenda, without exception, and,
 - 2.1.4 The Bidder is fully qualified under all Louisiana State Laws, and all local licensing laws for Contractors in effect at the time and at the location(s) of the Work before submitting his Bid, and that all of his Sub-bidders or prospective Sub-contractors are duly licensed in accordance with all laws, (if required).
 - 2.1.5 His bid is not based on any verbal instructions contrary to the Contract Documents and addenda.

ARTICLE 3

BIDDING DOCUMENTS

- 3.1 COPIES
 - 3.1.1 Bidding Documents may be obtained directly from the Architect for a deposit of amount per set as described in Article 11. Deposits will be refunded only if Bidding Documents are received by the Architect within 10 days after bid date specified in the Advertisement for Bids. No deposits will be refunded if Bidding Documents are received late. No deposit will be refunded for returned torn, not bound, nor incomplete, partial sets of Bidding Documents which are not in good condition. The Architect will not call to warn bidders when Bidding Documents are due. Submit Louisiana Contractor's License Number, name and address phone, and fax when ordering plans.
 - 3.1.2 Cost of postage paid by bidders to receive plans will not be refunded. All costs of postage or delivery to return sets of documents to the Architect shall be paid for by the company which procured said sets.
 - 3.1.3 Bid documents are also available from this website: www.slidellfire.org
 - 3.1.4 Bidders shall use complete sets of Bidding Documents in preparing bids; neither the Owner nor the Architect assumes responsibility for errors, omissions, and misinterpretations resulting from the use of incomplete sets of Bidding Documents. Prior to bidding, verify all specification page numbers and Drawing sheet numbers with the specified index to insure receipt of all documents.
 - 3.1.5 The Owner or Architect in making copies of the Bidding 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 permission for any other use of the Bidding Documents.
- 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS
 - 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work of separate contractors to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and all local conditions, and shall at once report to the Architect all ambiguities, inconsistencies, or errors discovered in the Bidding Documents or errors relating to the Project site.

- 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect to reach him at least seven (7) working days, exclusive of weekends and holidays, prior to the date for receipt of Bids.
- 3.2.3 Interpretations, corrections, or changes of the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.
- 3.3 SUBSTITUTIONS- (PRIOR APPROVAL REQUIRED)
 - 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.
 - 3.3.2 No substitution will be considered prior to receipt of Bids unless a complete written request for approval has been submitted by the proposer and has been received by the Architect at least seven (7) working days, exclusive of weekends and legal holidays, prior to the date for receipt of Bids (RS 38:2295C).
 - 3.3.3 All request shall include the name of the material or equipment for which it is to be substituted, the location, and a complete description of the proposed substitute including model numbers, colors, textures, drawings, cuts, performance and test data and all other detailed information necessary for a complete evaluation. A written statement setting forth all changes in other materials, equipment, or other portions of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included.
 - 3.3.4 The burden of proof of the merit of the proposed substitution is upon the proposer. Incomplete product submittals not indicating meeting the standards specified, colors, textures, actual samples, sufficient dimensions, quality, and strength of materials, and other standards specified will not be reviewed and will not be added to the list of prior approvals specified by addendum.
 - 3.3.5 The Architect's decision of approval or disapproval of a proposed substitution shall be final.
 - 3.3.6 The Architect reserves the right to reject products for which incomplete test data, samples, telephone numbers of users of products and information has been submitted. All test data and information shall meet or exceed standards specified. Manufacturers are responsible for submitting all information and all additional information requested by the Architect prior to the date specified above. Substitutions which require substantial revision of the Contract Documents will not be considered. The Architect reserves the right to reject materials and equipment proposed for this Project.
 - 3.3.7 The Contractor shall have the option to use prior approval substitutions. No extra payment by Change Order will be approved for additional Work, materials, and equipment required to incorporate prior approved substitutions.
 - 3.3.8 If the Architect approves a proposed substitution, prior to receipt of Bids, such approval will be set forth in a written Addendum. Bidders shall not rely upon approvals made in any other manner.
 - 3.3.9 The Architect reserves the right to reject materials and equipment at a later date after opening of bids if it is detected by the Architect that incomplete or false information was submitted prior to bidding.
- 3.4 ADDENDA
 - 3.4.1 Addenda will be attempted to be mailed by the Architect to all who are known by the Architect to have received a complete set of Bidding Documents. Because of errors in addresses, mistakes by mail carriers, and other human errors, all addenda are not always delivered to all bidders on time, all of the time.

- 3.4.2 All bidders who have received or who have reviewed bidding documents shall be responsible for verifying whether or not they have received all Addenda. Do not rely solely on mail, published reports, printed journals, published reports, or other delivery or information systems to verify receiving all Addenda.
- 3.4.3 All bidders shall be responsible for calling the Architect's Office within 72 hours prior to the date and time of opening of Bids to verify receipt of all Addenda issued by the Architect. All Bidders shall be responsible for picking up all Addenda not yet received from the Architect's office.
- 3.4.4 Copies of Addenda will be attempted to be made available for inspection wherever Bidding Documents are on file for that purpose, however, call the Architect to verify Addenda receipt.
- 3.4.5 Addenda shall normally not be issued within a period of seventy-two (72) hours, excluding weekends and any legal holiday, prior to the advertised time for the opening bids except an Addendum withdrawing the specified request for Bids, or one which includes postponement of the date for receipt of Bids. If it is necessary to issue an addendum within the seventy-two (72) hour period prior to receipt of bids, the receipt of such bids shall be extended a minimum of exactly seven (7) days, or more, up to 30 days without the requirement of re-advertising. The Owner shall be consulted prior to issuance of such an addendum, and shall approve such issuance.
- 3.4.6 All Bidders shall ascertain prior to submitting Bids that they have received all Addenda issued by the Architect, and all Bidders shall acknowledge said receipt in the space indicated on the Bid Form.
- 3.4.7 Failure to acknowledge receipt of all Addenda issued for this Project in the space(s) specified on the Bid Form will render the proposal informal and will cause its rejection.
- 3.4.8 All addenda shall become part of the Contract Documents. All Bidders shall be bound by all Addenda whether or not received by said Bidders.
- 3.4.9 The Owner shall have the right to extend the bid date by up to (30) days. Any such extensions shall be made by addendum issued by the Architect.

ARTICLE 4 BIDDING PROCEDURE

- 4.1 **FORM AND STYLE OF BIDS**
 - 4.1.1 Bids shall be submitted on forms identical to the bid form included with the Bidding Documents, or as modified by Addenda. Legible copies of the bid form are acceptable.
 - 4.1.2 All blanks on the bid form shall be filled in by typewriter or manually in ink.
 - 4.1.3 Where so indicated by the makeup of the bid form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written words shall govern.
 - 4.1.4 Interlineations, alterations, and erasures of the filled in information shall be initialed by the signer of the Bid, or his duly authorized representative.
 - 4.1.5 Bidders are cautioned to complete all alternates should such be required in the Bid Form. Failure to submit alternate prices will render the Proposal informal and will cause its rejection. If no change in the Base Bid is required by the Alternate, enter "No Change" for the Alternate(s), (if any).

- 4.1.6 The Bidder shall make no additional stipulations on the bid form nor qualify his Bid in any other manner.
- 4.1.7 The Bid shall include the legal name of Bidder and a statement that the Bidder is a sole proprietor, a partnership, a corporation, or other legal entity where indicated on the bid form. The Bid shall be signed by the person or persons legally authorized to bind the Bidder to the specified Contract. A Bid by a legal entity shall have filed in the Secretary of State's office a resolution indicating the names of all parties authorized to submit public bids for public contracts if required by State law, or a bid by a legal entity shall have a corporate resolution attached to the bid if required by State law, and shall give the state of incorporation. A Bid by a corporation shall have the person signing the Bid who is an officer of the corporation. A Bid submitted by an agent shall have a current Power of Attorney attached certifying the agent's authority to bind the Bidder. Verify complying with all Louisiana bidding law requirements prior to submitting bids.
- 4.1.8 On any bid in excess of fifty thousand dollars (\$50,000.00), the Contractor shall certify that he is licensed under R. S. 37:2150-2163 and indicate his Louisiana Contractor's license number on the outside of the bid envelope.
- 4.2 BID SECURITY
- 4.2.1 No Bid will be considered or accepted unless the bid is accompanied by a bid security in an amount of not less than five percent (5%) of the Base Bid and all additive 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 (A.I.A. Document A310) written by a surety company licensed to do business in Louisiana, countersigned by a person who is under contract with the surety company or bond issuer as a licensed agent in Louisiana who is residing in Louisiana and accompanied by appropriate power of attorney and in favor of the Owner. The surety company shall be licensed to do business in the State of Louisiana listed in the Department of the Treasury Circular 570, latest revision. The Surety Company shall have an A.M. Best Company minimum rating with a minimum financial size in accordance with the General Conditions. No company, regardless of the size or financial rating, will be allowed to write its own bond.
- 4.2.2 Bid security furnished by the Contractor shall guarantee that the Contractor shall, if awarded the Work according to the terms of his proposal, enter into the Contract and furnish Performance and Payment Bond(s) and insurance as required by these Contract Documents, within the time specified in the Supplemental General Conditions, Article 11 or after verbal or written notice has been issued that the instrument is ready for his signature.
- 4.2.3 Should the Bidder refuse to enter into such Contract or fail to furnish such bonds or insurance, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as penalty.
- 4.2.4 The Owner will have the right to retain the bid security of Bidders until either (a) the Contract has been executed and bonds and insurance have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.
- 4.2.5 If the Bid Security attached to the bid form is a Bid Bond, then said Bid Bond shall be prepared as specified herein.
- 4.3 SUBMISSION OF BIDS
- 4.3.1 Bids, bid security, and all other additional required information, (if any, and if specified), shall be enclosed and sealed in an opaque bid envelope.
- 4.3.2 The outside of the bid envelope (or outermost envelope if mailed by and delivered by United States Mail, Express Mail, Priority Mail, UPS, Federal Express, and all other similar types of carrier delivery,) shall be labeled as follows:

- o Addressed to the Owner
 - o Identify the name of the Bidder
 - o Identify the sealed bid envelope exactly as follows, SEALED - NEW FIRE STATION & HEADQUARTERS BUILDING
 - o Identify the Louisiana Contractor's license number of the Bidder (if applicable)
 - **Failure to label all envelopes or boxes exactly as stated above shall result in a MANDATORY rejection of this bid. Owner does not have the right to waive informalities as dictated by public bid law. Sole responsibility for properly labelling, mailing and delivering of bids is that of the bidder.**
- 4.3.3 Sealed Bids will be received by the Owner until the time and date, and at the location specified in the Advertisement for Bids.
- 4.3.4 Bidders submitting bids to the Owner's bid receipt location shall assume full responsibility for the timely delivery and Owner's receipt of bids at the specified location prior to the time and date specified for receipt of Bids.
- 4.3.5 Bids may also be submitted electronically via N / A . Include all required bid documents by attaching them with electronic bids.
- 4.3.6 Owner's receipt of a bid for any reason after the date and time stipulated on the Advertisement for Bids, including but not limited to late delivery by carrier service, late mail, late hand delivery by anyone, leaving bid(s) with someone not specifically designated by the Owner to receive bid(s) prior to bid receipt, incorrect addresses, misunderstood information, misunderstood directions, or all other types of late delivery, and excuses shall disqualify the bid.
- 4.3.7 Thoroughly review Bid Form early to insure having all of the required information on time.
- 4.3.8 Bids received after the time and date specified for the receipt of bids will be returned unopened.
- 4.3.9 Oral, telephonic, "faxed", or telegraphic Bids or modifications to bids are invalid and will not receive consideration. The Owner will not consider notations written on the outside of the Bid Envelope which have the effect of the Bidder trying to amend the Bid.
- 4.3.10 Bids will be accepted only from Contractors that attend the Pre-Bid Conference. Date, time and location of the Pre-Bid Conference are indicated in the Advertisement for Bids.
- 4.4 MODIFICATION OR WITHDRAWAL OF BID
- 4.4.1 A bid may not be modified, withdrawn or cancelled 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 the Bidder so agrees in submitting his Bid, except in accordance with Act 111 of 1983 which states, in part, "Bids containing patently obvious mechanical, clerical, or mathematical errors may be withdrawn by the Contractor if clear and convincing sworn, written evidence of such errors is furnished to the public entity or Owner within forty-eight hours of the bid opening excluding Saturdays, Sundays and legal holidays".
- 4.4.2 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. A change shall be so worded as not to reveal the amount of the original bid.

- 4.4.3 Withdrawn bids may be changed, re-sealed, and resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders and all of the Bidding Documents and Contract Documents.
- 4.4.4 Bid Security shall be in an amount sufficient for the Bid as modified or resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

5.1 RECEIPT OF BIDS

- 5.1.1 All properly identified Bids received on time will be opened publicly and will be read aloud as specified in the Advertisement for Bids.
- 5.1.2 Bids without Louisiana Contractor's license numbers on the bid envelopes may be opened and may be read aloud if it is thought that the proposed Project may be under \$50,000.00. Said Bids may be acceptable if the Bids are under \$50,000.00 and they meet all requirements of the Contract Documents.

5.2 REJECTION OF BIDS

- 5.2.1 The Owner will have the right to reject any or all Bids and in particular to reject a Bid not accompanied by a required bid security or data or information required by the Bidding Documents or reject a Bid which is in any way incomplete, irregular, or not in compliance with the Contract Documents.

5.3 ACCEPTANCE OF BID (AWARD)

- 5.3.1 Determination of the low Bidder shall be on the basis of the sum of the Base Bid, and the Alternates accepted by the Owner, (if any).
- 5.3.2 The Owner reserves the right to accept or reject alternates which, in the Owners judgement, is in the Owner's own best interest.
- 5.3.3 If the Owner decides to accept one (1) or more Alternates, (if any), and if accepting certain Alternates determines a low bidder, Alternate(s) will be accepted in numerical order.
- 5.3.4 If the Owner decides to accept one (1) or more Alternates, (if any), and if accepting certain Alternates does not determine a low bidder, Alternate(s) may be accepted out of numerical order.

ARTICLE 6 POST-BID INFORMATION

6.1 CONTRACTOR'S QUALIFICATION STATEMENT

- 6.1.1 Upon request by the Architect or the Owner, Bidders may be required to submit properly executed AIA Document A 305, Contractor's Qualification Statements. In addition, any bidder may be required, at the discretion of the Owner, to furnish evidence satisfactory to the Owner that his proposed subcontractors have sufficient means and experience in the types of work called for to assure completion of the contract in a satisfactory manner.

- 6.2 At the Pre-Construction Conference, the contractor shall submit the following information to the Architect.
 - 6.2.1 A designation of the work to be performed by the Contractor with his own forces.
 - 6.2.2 A breakdown of the contract cost attributable to each item listed in the Schedule of Values Form (attached). No payments will be made to the Contractor until this is received.
 - 6.2.3 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 and Ascension Parish Subcontractors, manufacturers, suppliers and labor.

ARTICLE 7 PERFORMANCE AND PAYMENT BOND AND INSURANCE

7.1 BOND REQUIREMENTS

- 7.1.1 The Contractor shall furnish and pay for a performance and payment bond written by a company licensed to do business in Louisiana, and shall be countersigned by a person who is contracted with the surety company or bond issuer as an agent of the company or issuer, and who is licensed as an insurance agent in this state, and who is residing in Louisiana, in an amount equal to the 100% of the Contract amount to guarantee delivery of completed work under contract and payment for labor and materials. These bonds shall be written on A.I.A. Document A312, Current Edition. No company, regardless of size or financial rating, will be allowed to write its own bonds. The Surety Company shall have an A.M. Best Company minimum rating with a minimum financial size in accordance with the General Conditions. Bonds must be accompanied by letter stating bonding company's current rating for verification prior to acceptance by the Owner and execution of the formal Owner/Contractor agreement.

7.2 TIME OF DELIVERY

- 7.2.1 The Bidder shall hand deliver the specified required bond(s) to the Owner prior to the Owner's signing of the Contract. The Bidder shall be responsible for picking up a copy of the Contract from the Architect and delivering same to the bonding agency, securing the required, signed bond(s) and delivering same to the Architect and Owner in a very timely manner.
- 7.2.2 The bond(s) shall be dated on the date of commencement of Work indicated in the Contract.
- 7.2.3 The Bidder shall require the Attorney-in-Fact who executes the required bond(s) on behalf of the surety to affix thereto a certified and current copy of his power of Attorney.
- 7.2.4 Original insurance certificates, signed in ink, indicating amounts of insurance required, Louisiana Workmen's Compensation, and all other specified insurance shall be presented to the Owner with the bond(s). Copies of originals and "faxed" copies of certificates of insurance are not acceptable.
- 7.2.5 No actual physical on site work shall begin prior to securing specified insurance and bonds.

ARTICLE 8
FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

8.1 FORM TO BE USED

- 8.1.1 Unless otherwise specified, the form of the Contract to be used shall be AIA Document A101, Standard Form of Agreement between Owner and Contractor, 2007 Edition where the basis of payment is a Stipulated Sum. The agreement form will be prepared by the Architect for the Owner and issued to the Contractor for execution and returned to the Owner for signature. Executed bonds and insurance certificate must be submitted to the Owner by the Contractor within ten (10) days of the date of the Notice of Award.

8.2 AWARD

- 8.2.1 If awarded, the Contract will be let to the lowest responsible bidder whose base bid is within the project budget and is able to furnish satisfactory surety company bonds. Before award of the Contract, the successful bidder shall furnish to the Owner a certified copy of the minutes of the corporation or partnership meeting which authorized the party executing the bid to sign on behalf of the Contractor. Should all bids exceed the project budget, award will be made at option of the Owner to the lowest responsible bidder whose base bid is within funds available.

ARTICLE 9
COMPLETION TIME AND LIQUIDATED DAMAGES

- 9.1 The Bidder shall commence the Work under this Contract on a date specified by the Owner as specified in Article 8 of the Supplementary Conditions and to complete the work within 270 calendar days after the Notice to Proceed.
- 9.2 Completion of the Contract shall be subject to such extensions as may be granted in the General Conditions and the Supplementary Conditions, or the Contractor will be subject to pay to the Owner Liquidated Damages per the following schedule:

SCHEDULE OF LIQUIDATED DAMAGES

Contract Amount	L.D. per Day
Up to \$100,000	\$ 100
\$100,000 to \$300,000	\$ 175
\$300,000 to \$500,000	\$ 200
\$500,000 to \$600,000	\$ 250
\$600,000 to \$800,000	\$ 400
\$800,000 to \$1,000,000	\$ 600
\$1,000,000 to \$2,000,000	\$ 700
\$2,000,000 to \$4,000,000	\$ 800
\$4,000,000 to \$6,000,000	\$ 1200
\$6,000,000 to \$8,000,000	\$ 1600
\$8,000,000 to \$10,000,000	\$ 1800
\$10,000,000 to \$12,000,000	\$ 2000
\$12,000,000 to \$15,000,000	\$ 2300
Above \$15,000,000	To be determined

**ARTICLE 10
ENVIRONMENTAL CONSIDERATIONS**

10.1 Inspection and Testing for Asbestos Content of Building Materials:

NOTICE!

Building materials which are scheduled to be incorporated into the work under the agreement shall first either be certified by the Manufacturer to be asbestos free or be inspected and tested by accredited parties and certified to be free of asbestos content in accordance with by EPA, AHERA, and 1982 School Rules.

"Asbestos" means the Asbestiform varieties of: Chrysotile (Serpentine), Crocidolite (Riebecrite), Ammosite (cummingtonitegrunerite), Anthophyllite, Tremolite and Actinolite.

Materials shall not be incorporated into the work prior to the receipt of either manufacturer certification or accredited laboratory test results indicating the building material is asbestos free. Copies of the test reports shall be furnished to the Owner and the Architect.

The Owner reserves the right to inspect and take samples at random at the job site. Materials containing asbestos shall be removed immediately at the Contractor's expense using current EPA protocol for the removal of asbestos containing materials.

**ARTICLE 11
ADDITIONAL BIDDER INFORMATION**

11.1 Bidding Documents may be obtained from the Architect:

Firm Name: St. Tammany Fire Protection District No. 1 Headquarters
Contact Name: Chad Duffaut
Address: 1358 Corporate Square Drive
City, Louisiana Zip Code: Slidell, LA 70458
Phone:
E-mail: cduffaut@slidellfire.org

11.1.1 A plan deposit of 400.00 is required for each set of complete bidding documents requested. No partial sets will be issued.

11.1.2 N / A

11.1.3 Deposits on the first set of documents issued to bonafide prime bidders (bidders submitting bids for the entire project on the specified project bid forms) will be fully refunded (100%) upon return of complete bound documents, received by the architect in good condition no later than ten (10) days after the bid date as specified in the Advertisement for Bids. All other sets of documents will be refunded (50%) of the deposit upon return of complete bound documents, received by the architect in good condition no later than ten (10) days after the bid date as specified in the Advertisement for Bids.

**ARTICLE 12
POST-BID SUBMITTAL FORMS**

- 12.1 Only the apparent low bidder is required to submit the following completed forms within ten days after bid opening. These blank forms are included in the project specifications manual.
- Attestation Clause Form
 - Verification of Employees Affidavit
 - Non-collusion Affidavit
- 12.2 The bidder SHOULD NOT include these forms in the bid envelope.
- 12.3 The apparent low bidder has a maximum of 10 days from the bid opening to produce any required post bid submittal forms. If the apparent low bidder does not submit the proper information or documentation as required by the bidding documents within the ten-day period, such bidder shall be declared non-responsive, which will result in automatic disqualification of bid.

End of Instructions to Bidders

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: St. Tammany Fire Protection District No. 1
1358 Corporate Square Drive
Slidell, LA 70458

(Owner to provide name and address of owner)

BID FOR: New Fire Station & Headquarters Building
522 Robert Boulevard
Slidell, LA 70458

(Owner to provide name of project and other identifying information)

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: greenleaf architects / domain architecture and dated: January 23, 2017

(Owner to provide name of entity preparing bidding documents.)

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

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

_____ Dollars (\$ _____)

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

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N / A _____ Dollars (\$ _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N / A _____ Dollars (\$ _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N / A _____ 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 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.

** If someone other than a corporate officer signs for the Bidder/Contractor, a copy of a corporate resolution or other signature authorization shall be required for submission of bid. Failure to include a copy of the appropriate signature authorization, if required, may result in the rejection of the bid unless bidder has complied with La. R.S. 38:2212(A)(1)(c) or RS 38:2212(O) .

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

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: St. Tammany Fire Protection District No. 1
 1358 Corporate Square Drive
 Slidell, LA 70458

(Owner to provide name and address of owner)

BID FOR: New Fire Station & Headquarters Building
 522 Robert Boulevard
 Slidell, LA 70458

(Owner to provide name of project and other identifying information)

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

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

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

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

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

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

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

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

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

Document 004300 – Bid Bond

American Institute for Architects, AIA Document A310, 2010 edition, Bid Bond Form, is included in this project by reference.

Obtain this copyrighted form by purchasing from AIA-Louisiana office (tel. 225-387-5579), or other agencies authorized to issue this form.

Complete and submit this form with the Bid.

Name of Project

Project No.

**ATTESTATION CLAUSE REQUIRED BY
LA. R.S. 38:2227 (PAST CRIMINAL CONVICTIONS OF BIDDERS)**

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:

- 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)

(c) Extortion (R.S. 14:66)

(b) Corrupt influencing (R.S. 14:120)

(d) Money laundering (R.S. 14:23)

- 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)

(f) Bank fraud (R.S. 14:71.1)

(b) Identity Theft (R.S. 14:67.16)

(g) Forgery (R.S. 14:72)

(c) Theft of a business record
(R.S.14:67.20)

(h) Contractors; misapplication of
payments (R.S. 14:202)

(d) False accounting (R.S. 14:70)

(i) Malfeasance in office (R.S. 14:134)

(e) Issuing worthless checks
(R.S. 14:71)

NAME OF BIDDER

NAME OF AUTHORIZED SIGNATORY OF BIDDER

DATE

TITLE OF AUTHORIZED SIGNATORY OF BIDDER

**SIGNATURE OF AUTHORIZED
SIGNATORY OF BIDDER**

AFFIDAVIT

L.A. R.S. 38:2212.10 Verification of Employees

STATE OF _____

PARISH/COUNTY OF _____

BEFORE ME, the undersigned authority, duly commissioned and qualified within and for the state and parish or county aforesaid, personally came and appeared _____
(name/print or type)

representing _____,
(company/print or type) (mailing address/print or type)

who, being by me first duly sworn deposed and said that he or she has read and signed this Affidavit and he/she does hereby attest, under oath, as follows:

- 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.

Prospective bidder or representative to sign **and** type or print name below signature

Affiant – Signature

Printed Name

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ day of _____, 2____.

NOTARY PUBLIC

NON-COLLUSION AFFIDAVIT

PROJECT: New Fire Station & Headquarters Building

AFFIDAVIT

BEFORE ME, the undersigned authority, duly commissioned and qualified within and for the state and parish aforesaid, personally came and appeared _____ representing _____ 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:

Section 2224 of Part II of Chapter 10 of Title 38 of the La. Revised Statutes of 1950 as amended.

(1) That affiant and his firm employed no person, corporation, firm, association, or other organization, either directly or indirectly, to secure the public contract for the above-referenced project with the Ascension Parish School Board under which he will, if awarded the contract, receive or 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 to be received or received by affiant or his firm 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 of the public building or project were in the regular course of their duties for affiant.

Bidder or representative to sign
and type name below signature➡

_____AFFIANT

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 20__.

NOTARY PUBLIC

Note: This form is to be removed and attached to the Bid Proposal Form.

Document 005200 - Agreement

American Institute for Architects, AIA Document A101, 2007 edition, Standard Form of Agreement between Owner & Contractor, is included in this project by reference.

Upon request to the Architect, copies will be furnished for reference.

Document 006000 - Performance Bond, and Labor and Material Payment Bond

American Institute for Architects, AIA Document A312, Performance Bond, and Labor and Material Payment Bond, is included in this project by reference.

Upon request to the Architect, copies will be furnished for reference.

General Conditions

American Institute for Architects, AIA Document A201, 2007 edition, General Conditions of the Contract for Construction, is included in this project by reference.

Copies of this document are available, upon request, for review at the Architect's office.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify, change, delete from, or add to the *General Conditions of the Contract for Construction, AIA Document A201 - 2007 Instructions*.

Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

Articles, 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 DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

In Subparagraph 1.1.1 delete the third sentence, and add the following sentence:
The Contract Documents shall include the Bidding Documents as listed in Article 9, of the A101 – 2007 Agreement between Owner and Contractor and any modifications made thereto by addenda.

1.1.9 through 1.116

Add the following paragraphs after paragraph 1.1.8:

1.1.9 PROJECT MANUAL

The Project Manual is a volume assembled for the Work that may include bidding requirements, samples forms, Conditions of the Contract, Specifications, Drawings and Addendum issued prior to Bid Opening.

1.1.10 PRODUCT

The term “Product” includes materials, systems and equipment.

1.1.11 PROVIDE

The term “Provide” means the furnishing and installing of a product, complete in place, operating, tested and approved: and includes paying for the cost of all labor, materials, equipment, tools, construction equipment and machinery, permits, water, heat, gas, electricity, utilities, shipping, transportation, taxes and all other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

1.1.12 BUILDING CODE AND CODE

The terms “building code” and “code” refer to regulations of governmental entities having jurisdiction.

1.1.13 “SHOWN,” “INDICATED,” “DETAILED,” “NOTED,” “SCHEDULED”

The terms “shown,” “indicated,” “detailed,” “noted,” “scheduled,” and terms of similar import, refer to requirements contained in the Contract Documents.

1.1.14 “ACCEPTABLE,” “APPROVED,” “REQUIRED,” AND “AS DIRECTED”

The terms “acceptable,” “approved,” “required,” and “as directed” refer to or indicate work or materials that may be acceptable or approved by the Architect, as the Owner’s agent, only to the extent the work or materials conform to the requirements of the Contract Documents and in no way shall be interpreted to imply any responsibility on the part of the Architect concerning the Contractor’s obligations under Paragraphs 3.3, 3.11, 3.12, 4.2, 10.2.

1.1.15 ‘KNOWLEDGE’ AND ‘RECOGNIZED’

The terms “knowledge” and “recognized” , their respective derivatives and similar terms in the Contract Documents as used in reference to the contractor, shall be interpreted to mean that which the Contractor knows, or should know, recognizes, or should recognize, in exercising the care, skill and diligence required by the Contract Documents. Analogously, the expression “reasonably inferable” and similar terms of the Contract Documents shall be interpreted to mean reasonably inferable by a bidding the Project and exercising the care, skill and diligence required of the Contractor by the Contract Documents.

1.1.16 “NIC” AND “NOT IN CONTRACT

The terms “NIC” and “Not in Contract” indicate items which are shown or indicated for convenience but are not included as part of this Contract.

1.2.1 After the last sentence, add the following:

In the event of a discrepancy in the Contract Documents, the more specific and more detailed descriptive information will take precedence over the general and less detailed description. In case of doubt, the Contractor shall assume that the owner intends that the higher quality, more complete method, system, or process is required. Any work, labor, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce a functionally complete Project or part thereof, will be supplied by the Contractor whether or not specifically stated in the Contract Documents. Reference to standard specifications, manuals, or codes of any technical society, organization, or association or to the laws or regulations of any governmental authority, whether such reference is specific or by implication shall mean the latest standard specifications, manual, code or laws or regulations in effect at the time of the opening of the bids (or the date of the Contract if no advertised bids), unless otherwise specifically stated. However, no provision of any standard specification, manual, or code shall be effective to change the amount of the contract or to change the duties or the responsibilities of the Owner, Contractor or Architect or any of their consultants, agents or employees from those set forth in the Contract Documents.

ARTICLE 2 OWNER

2.1.2 Add the following after the end of the paragraph:

The Owner reserves the right to require the Contractor, all subcontractors and material suppliers to provide lien releases at any time. The Owner reserves the right to withhold progress payments until such lien releases are received for all work for which prior progress payments have been made. Upon the Owner's demand for lien releases (either verbally or written), the Contractor, all subcontractors and material suppliers shall provide such releases with every payment request until Final Acceptance of the Project.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 Delete this paragraph.

2.2.3. Add at the end of the sentence:

Notwithstanding, the Owner does not guarantee the accuracy of surveys provided regarding the location of utility lines, cables, phone lines, pipes or pipelines or the presence or absence of easements. The Contractor shall confirm the location of each utility and make further investigation of all structural, surface and subsurface conditions of the site of the Project.

2.5 Add 2.5 and 2.6 as follows:

2.5 OWNER'S REPRESENTATIVE

The Architect or Engineer or other professional retained by the Owner to design the Project has the responsibility to administer the Contract for Construction, including observation by himself and his consultants. The assignment of an Owner's Representative in no way transfers any of the professionals of record responsibilities to the Owner.

2.6 OWNERS RIGHT TO AUDIT

The Contractor shall keep full and accurate records of all costs incurred and items invoiced in connection with the Work. These records shall be made available and open to audit by the Owner or its authorized representatives, or the Legislative Auditor for the State of Louisiana during the performance of the Work and for a period of three (3) years after Final Payment.

ARTICLE 3 CONTRACTOR

3.2.1 Add the following at the end of the paragraph:

The Contractor thoroughly understands the Contract Documents and their intent and purpose. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the site. The Contractor is solely responsible for providing a safe place for the performance of the Work. Contractor shall comply with the provisions of the Louisiana Underground Utilities and Facilities Damage Prevention law, R.S. 40:1749.11 et al, as amended prior to any portions of the Work that may require excavation including but not limited to pile driving, digging, auguring, boring, backfilling, dredging, compressing, plowing-in,

trenching, ditching, tunneling, land leveling, grading and or mechanical probing. Damage to any existing underground utilities by the Contractor shall be repaired at the Contractor's sole expense if surveys or other information that has been provided or is available to the contractor indicate the location of said utilities. The Contractor shall undertake to make such further investigations, and coordinate with the Owner to determine the appropriate course of action. Once the course of action is determined, the owner reserves the right to make the appropriate modifications and back-charge the contractor if immediate action is not taken.

3.2.5 Add the following 3.2.5:

3.2.5 Building materials to be incorporated into the Work shall either be certified, in writing, by the manufacturer to be asbestos free or be inspected and tested by accredited testing laboratories and certified to be free of asbestos content in accordance with applicable federal standards, including but not limited to the Asbestos Hazard Emergency Response Act (AHERA) and the Toxic Substance Control Act (TSCA). The word "asbestos" means the Asbestiform, Tremolite, and Actinolite. Copies of tests reports shall be furnished to the Architect. Material discovered to contain asbestos shall be removed immediately at the Contractor's sole cost and expense using current standards of the Louisiana Department of Environmental Quality (DEQ).

3.3.4 Add the following paragraph:

3.3.4 The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage or any unexplained disappearance of property of the Owner. The Contractor shall have full responsibility for the security of such property of the owner for any such loss, damage or injury.

3.5 Add the following sentence to the end of the Paragraph:

The Contractor shall warrant and guarantee all material and workmanship for a period of one calendar year from the date of recordation of a certificate of Substantial Completion. This warranty shall be in addition to and not in limitation of any other warranty or remedy provided by law or by the Contract Documents.

3.6 TAXES

At the beginning of the sentence, add: "Unless otherwise provided in the Contract Documents,"

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

Add 3.7.1.1

3.7.1.1 Before any Work begins, or within thirty (30) days from the date the Contract is executed, whichever occurs first, the Contractor, at his own expense, shall record the Contract and Bond or Bonds required with the Clerk of Court for the required parish or county. The Contractor shall furnish the Architect and Owner with a Certificate of Recordation, including date, time, book, and folio number. No payment shall be made until Owner received certificate of recordation.

3.8 SUPERINTENDENT

3.8.1: Add the following sentence to the end of the paragraph:

“All communications potentially having a bearing on the project schedule, scope or cost shall be documented in writing by the superintendent, and distributed to the Architect. Other communications shall be similarly documented on written request in each case.”

3.9 CONTRACTOR’S CONSTRUCTION SCHEDULES

3.9.1 : Add the following sentence to the end of the paragraph:

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 to completion. Note where any delay in the completion of these tasks will lengthen the project timescale. A revised schedule showing an updated critical path to completion shall be submitted monthly, with each Application and Certificate for Payment. No payment will be made until this schedule is received.

3.10.3: Add the following sentence to the end of the paragraph:

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 14.2.

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.

3.12.7 Add at the end of the sentence:

Should the Contractor, subcontractor or sub-subcontractor install, construct, erect or perform any portion of the Work without approval of any required submittal, the Contractor shall bear the cost, responsibility and delay for removal, replacement and/or correction of any and all items, materials and/or labor.

3.13 Use of Site

Add the following sections:

3.13.1 The Contractor acknowledges that the Contractor has inspected the site prior to award and accepted the areas for parking, storage and lay-down of materials and access to the site. The Owner will not be required to alter or interrupt any other operations at the Project site.

3.13.2 The Contractor and any entity for which the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner.

3.13.3 Without the prior written approval of the Owner, the Contractor shall not permit any worker to use any existing facilities (lavatories, toilets, entrances or similar items) at the Project site other than those designated in the Contract Documents.

Add the following Sections:

3.19 LOG OF CHANGES

The Contractor shall maintain a current log of all RFI's, Change Orders and Construction Change Directives at the site of the Project and shall provide the Owner and Architect access to the same as requested. All such logs must be updated and reviewed at monthly project meetings.

3.20 FAILURE TO PERFORM WORK

Contractor shall be liable to the Owner for all cost or damages that the Owner incurs as a result of the Contractor's failure to perform the Work, or any part thereof, in accordance with the Contract Documents. Contractor's failure to perform shall include, but not be limited to, the failure of its subcontractors and/or suppliers of any tier to perform. The Contractor's liability to the Owner shall include, but not be limited to (1) the increased cost of performance, including extended services of the Architect, Owner's Construction Manager and other consultants, resulting from the Contractor's failure to comply with the Contract Documents; (2) costs of corrective or warranty work; (3) liability to third parties; (4) re-procurement costs; (5) attorney fees and related costs, including costs incurred in enforcing Owner's rights under the Contract Documents; and (6) liquidated damages.

3.21 LIENS

In the event a lien is filed by anyone in relation to the Work, the Owner shall have the right (1) to require the Contractor furnish to the Owner a release of a Lien or claim recorded by the person or entity filling the claim; (2) to require the Contractor to discharge the Lien by posting a bond with the Clerk of Court within five (5) calendar days of notice by the Owner to the Contractor; and/or (3) to retain out of any payment due or thereafter to become due an amount sufficient to indemnify the Owner against any Lien or claims of a Lien, including bond premiums and attorney fees and to apply the same in such manner as Owner deems necessary to satisfy such claim and Liens.

In the event such Lien is not discharged, the Contractor at its sole cost and expense, including attorney fees, shall hold harmless and defend Owner of and from any and all claims, lawsuits, causes of actions and demands of any person or entity asserting or claiming any right as a result of any Lien or claim recorded or unrecorded, against the Contract Funds or the Owner's property.

The Owner shall have the right to terminate the Contract for default or to bond off said Lien (s) all costs incurred as a result thereof, including but not limited to, bond premiums and attorney fees.

Prior to the receipt of partial or Final Payment, as appropriate, Contractor shall provide the Owner a partial or final release of any liens or claims and a partial or final release of all Liens and claims of all persons furnishing labor and/or materials to the Work with satisfactory evidence that there are no other Liens or claims whatsoever outstanding against the Work or Contract.

3.22 WORK RELATED TO EXISTING FACILITIES

3.22.1 The Contractor shall not perform Work in existing buildings that will interfere with normal operations, normal traffic flow, produce excessive noise or shut down utilities without forty-eight (48) hours written notice to the Owner and then only with their concurrence.

3.22.2 All means of egress shall be maintained at all times during school occupancy to comply with exit requirements in the NFPA 101 Life Safety Code.

3.22.3 The Contractor shall not allow traffic or operations to encumber vehicle or pedestrian traffic during occupied hours to include before school and after school programs. Space for parking of Contractor's personnel and subcontractors is designated in the Contract Documents.

ARTICLE 4 ARCHITECT

4.1 GENERAL

Delete Subparagraph 4.1.1 and substitute the following:

4.1.1 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.

Where the term "Initial Decision Maker" (IDM) is used in the Contract Documents, the Architect is the Initial Decision Maker.

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 "*expiration of (1) one year correction period.*"

4.2.10 Delete the second sentence of this paragraph.

ARTICLE 5 SUBCONTRACTORS

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

Delete Subparagraph 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, the following prior to commencement of any work: No Contractor payments shall be made until this information is received in detail.

- a) Fixed job site overhead cost itemized with documentation to support daily rates.

- b) A written list of 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.
- c) Labor Burden by trade for both Subcontractors and General Contractor.
- d) Internal Rate Charges for all significant company owned equipment.
- e) Preliminary Schedule for Architect and Owner review. It is imperative that the schedule includes a critical path to completion. This Schedule shall be due within 14 calendar days following award of the contract.
- f) Contact list for General Contractor to include Project Manager and Superintendent.

5.2.4 Add the following: The Contractor shall notify the Architect and Owner of any change or substitution of any Subcontractor, and the owner reserves the right to make objections prior to commencement of work.

ARTICLE 7 CHANGES IN THE WORK

7.1 GENERAL

7.1.3 Add the following sentence at the end of the paragraph:

Contractor shall not proceed without executed/signed Change Order or other written authorization by the Owner.

7.2 CHANGE ORDERS

Add new 7.2.1.4

7.2.1.4 Any and all adjustments to the Contract Time requested or claimed by the Contractor as a result of a Change Order shall require the following written documentation and justification:

- a) The Contractor's most recent schedule in use prior to the change.
- b) A revised schedule indicating how the Change affects the Critical Path.
- c) Changes that affect or concern activities containing float or slack time (i.e. not on critical path) that can be accomplished within such float or slack time shall not result in an increase in the Contract Time.

Add the following new paragraphs:

7.2.2 Before a Change Order is prepared, the Contractor shall provide and deliver to the Architect the following information, not subject to waiver, within ten days after being notified to prepare said Change Order:

- 1. An itemized list of material and labor cost for each Subcontractor's and/or Sub-subcontractor's Work, including quantities and unit prices for each item of material.
- 2. An itemized list of material and labor cost for the General Contractor's Work, including quantities and unit prices for each item of labor and each item of material.
- 3. An updated project schedule clearly showing the impact the proposed change might have on the critical path to completion.

7.2.3 After a Change Order has been approved, no future request for extension/adjustments of Contract Time, Sum or cost shall be considered for that particular Change Order

7.2.4 The Architect will prepare a draft of the proposed Change Order. If all parties are in agreement to the scope of work changes and the Change Order is signed within 14 days of the original issuance, it shall be made part of the Contract Documents. If agreement is not reached within that time frame, the Owner reserves the right to instruct the Architect to issue a Change Directive, which will be administered per section 7.3.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.7 Delete the following phrase from the end of the first sentence: “the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount.” Replace with the following phrase: “section 7.3.7.6 found below.”

7.3.7 Delete the following from .1 of the list: “fringe benefits required by agreement or custom,”

Add 7.3.7.6

7.3.7.6 Portions of profit and overhead listed above that will be included in the Change Order, shall not exceed the following:

1. For the Contractor for work that is performed with its own forces, not to exceed 15% of the cost of the items listed above.
2. For the Contractor for work performed by his Subcontractor, 5% of the amount due the Subcontractor.
3. For each Subcontractor, or Subcontractor involved, for work performed by that Subcontractor's of Subcontractor's own forces, 15%.
4. For each Subcontractor, for work performed by the Subcontractor's Subcontractors, 5% of the amount due to the Subcontractor.
5. In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs including labor, materials, and subcontractors. Labor and materials shall be itemized in the manner specified above. Where major cost items are Subcontractor's cost items, they shall be itemized also.

Add 7.3.11 and 7.3.12

7.3.11 Changes in the Work performed by the Contractor without approval or consent of the Owner shall be performed at no cost to the Owner and without adjustment in the Contract Time.

7.3.12 By executing the Change Order, the Contractor acknowledges that:

1. The Owner bears no responsibility for the conditions resulting in the change to the scope of work.
2. The Change Order is for the full and final amount of the Contract Sum and the Contract Time adjustments due the Contractor for all additional Work related to the Change Order.
3. Any stated extension of Contract Time is equitable in nature and the Contractor waives any further claims for any additional Contract Time or any Contract Sum for whatever reason and of whatever kind, whether direct or indirect costs, profit, overhead or any

other expenses for the work, enumerated in the Change Order and any and all claims for an extension of Contract Time or additional Contract Sum are waived in their entirety.

ARTICLE 8 TIME

8.2 PROGRESS AND COMPLETION

Add the following paragraphs to Subparagraph 8.2.1:

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 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.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 In the first sentence after the words “owner pending” delete the words “mediation and arbitration” and replace with the word “litigation”. Delete the last word “determine” through the end of the sentence and substitute the following:

"...recommend, subject to Owner's approval of Change Order. If the claim is not made within the limits of Article 15, all right for future claims for that month are waived."

To the end of paragraph 8.3.1, add: “In any instance, the Contractor will be required to submit an updated project schedule, clearly showing the impact on the critical path to completion. In no instance will additional time be granted if the critical path to completion is not impacted.”

Add 8.3.4 and 8.3.5

8.3.4 The Owner’s operations will be impacted and delayed if the project is not substantially complete within 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 and agreed liquidated damages for each consecutive calendar day (Saturday’s, Sunday’s and holidays included), of delay until the Work is substantially complete or, as applicable until the Work is finally complete or the Punch List is complete (whichever occurs last). The Owner shall be paid the sum stated in the Contract Documents for liquidated damages.

Such liquidated damages shall be withheld by the Owner from the amounts due the Contractor for progress payments and deducted from the Contract Sum by a Construction Change Directive signed only by the Owner and Architect. If no funds are remaining, the Contractor shall pay the amount of liquidated damages within 15 days of written notification of the amount due.

8.3.5 If at any time the Work lags, sufficient increased Work forces and overtime hours, including weekends shall be provided by the Contractor to maintain the schedule to insure that the

Project is completed in accordance with the time set forth by the Contract Documents. Said overtime and cost of additional Work forces shall be paid for by the Contractor.

ARTICLE 9 PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Delete Subparagraph 9.2 and substitute the following 9.2 and 9.2.1:

9.2 At the Pre-Construction Meeting, the Contractor shall submit to the Architect and Owner a Schedule of Values allocated to the various portions of the Work, providing a detailed breakdown of the Contract Sum. The Contractor shall also submit such data to support and substantiate the accuracy of the schedule as the Architect and the Owner may require. The contents of the Project Manual shall be used as a basis for format for listing cost of Work.

9.2.1 The schedule of values shall be submitted on AIA Documents G 703 – 1992, Continuation Sheet, submitted in detail.

1. Use the Index of the Project Manual to list the description of Work required under column B of G 703. List costs of Work for each Division of the Specifications. The cost for each division shall include labor, materials, to be shown separately.
2. Under the General Conditions and Division 1, costs of Work of General conditions, Supplementary Conditions, Temporary Requirements, and Cleaning shall be listed separately with separate cost indicated for Insurance, Bonds, Temporary requirements, and Cleaning, listed separately thereafter and shall be paid for monthly, spread out during the entire period of the Contract. Large sums requested by the Contractor in an early part of the Contract, for items listed in this Paragraph, shall be submitted with invoices, marked paid, showing that these bills have been paid. Up-front unidentified cost of Work shall not be arbitrarily lumped under the General Conditions and Division 1.
3. Round off cost figures of each heading to the nearest dollar. The total of all items shall equal the total Contract Sum.
4. For a multiple site or location Contract, the Schedule of Values shall be allocated for each separate site or location.

9.3 APPLICATIONS FOR PAYMENT

Delete Subparagraph 9.3.1 substitute the following:

9.3.1 Monthly, the Contractor shall submit to the Architect an Application & Certificate for Payment on the AIA Document G702-1992, accompanied by AIA Document G703-1992, a Current Schedule, a notarized Contractor's Waiver and Release of Liens to Owner and supported by any additional data substantiating the Contractor's right to payment as the Owner or the Architect may require.

Change Orders and Construction Change Directives shall be individually identified as a separate item in any application for payment.

A Draft application for payment is to be provided and reviewed by the Architect and Owner at the Monthly Progress Meeting. The Final Monthly Application for Payment shall be submitted following the monthly meeting 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 R.S.38:2248:

- A) Projects with Contract price up to \$500,000.00 - 10% of the Contract price.
- B) Projects with Contract price of \$500,000.00, or more - 5% of the Contract price.
- C) No payment will be made until the revised schedule required by 3.10.1 is received.
- D) The normal retainage shall not be due and payable to the Contractor until after substantial completion and expiration of the forty-five day lien period and submission by the Contractor to the Architect of a clear lien certificate and invoice for retainage."

9.5.1 add 9.5.1.8 and 9.5.1.9 as follows:

9.5.1.8 the value of the Punch List:

9.5.1.9 or rejection of any part of the Work by any governmental authority having jurisdiction over the Project.

9.6 PROGRESS PAYMENTS

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:

"R.S. 9:2784 (A) and (C) requires 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 1/2 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 Add the following to the end of the Subparagraph:

Pursuant to La. R.S. 38:2242, 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.

9.7 FAILURE OF PAYMENT

Delete Subparagraph 9.7.

9.8 SUBSTANTIAL COMPLETION: Delete this entire section 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 and when all required occupancy permits, if any, have been issued and copies of the same delivered to the Owner.

The Architect shall determine if the Project is substantially complete in accordance with the Contract Documents.

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 and request the Architect's review. 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 The Work will not be considered suitable for Substantial Completion review until a) all Project systems included in the Work are operational as designed; b) designated instruction of the Owner's personnel in the operations systems has been completed; and c) all finishes within the Contract Documents are in place.

In general, the only remaining Work shall be minor in nature, so that the Owner may occupy the building on a certain date and the completion of the Work by the Contractor will not materially interfere or hamper the normal business operations of the Owner. A further prerequisite to the Work being accepted as Substantially Complete, is the Owner's receipt of the Roofing Manufacturer's warranties, where roof Work is a part of the Contract, and all other Required Warranties and Operating and Maintenance manuals

9.8.4 Upon receipt of the request for review and Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. The Contractor shall also notify the Architect when the Project is ready for inspection by the State Fire Marshall's Office. The Contractor and his mechanical, electrical and fire alarm/fire suppressive Subcontractors shall attend all inspections for Substantial Completion and inspections for occupancy conducted by the Louisiana State Fire Marshal, and other local officials.

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 items 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. The Architect will make only two (2) such inspections to determine Substantial Completion, after which the Contractor shall pay the Architect at the rate established in the Owner-Architect Agreement.

9.8.5 In addition to the inspection described in 9.8.4, upon receipt of the Contractor's list described in 9.8.2, the Architect shall prepare a "Punch List" of exceptions and the dollar value of each item. The monetary value assigned to this list will be **twice** of the estimated actual value of the items to be completed or corrected. Cost of these items shall be prepared in the same format

as the schedule of values. No funds assigned for the Punch List value shall be due the Contractor until all the Punch list items are completed and accepted by the Architect.

If the dollar value of the Punch List exceeds the remaining Contract Sum less the retainage amount, then the Project shall not be accepted as substantially complete.

As a further condition of obtaining certification of Substantial Completion, the Contractor shall certify that all remaining Work will be completed within Forty Five (45) consecutive calendar days following the date of Substantial Completion, or as otherwise agreed upon.

If the remaining funds are less than that required to complete the Work, the Contractor shall pay the difference within 10 calendar days of notice thereof.

9.8.6 When the Work or designated portion thereof is substantially complete as determined by the Architect, the Architect will prepare a Certificate of Completion that 1) shall establish the date of Substantial Completion, 2) shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and 3) shall fix the 'punch list period' of forty-five (45) calendar days or such other agreed upon period within which the Contractor shall finish all items on the Punch 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.

9.8.7 The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

Upon receipt of a fully executed Certificate of Substantial Completion with an attached Punch List, the Contractor shall record the Certificate of Substantial Completion, within 72 hours of issuance with the Clerk of Court in the Parish of Ascension, Louisiana and provide the recording information to the Owner and Architect.

9.9.1 Delete section 9.9.1 and substitute the following:

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 Subparagraph 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 After the first sentence, add the following:

If the Architect does not find the work acceptable under the Contract Documents, the Architect shall make one additional inspection. If the work is still not acceptable, the Architect, and each of the Architect's principal consultants, shall be paid at the rate established in the Owner-Architect Agreement, for their time at the project site for each additional inspection, to be withheld from the unpaid funds remaining in the Contract sum. The payment shall be made by the owner and deducted from the construction contract funds, or if no funds remain, paid directly by the Contractor or its surety.

9.10.2 Add the following to the end of the first sentence: (6) Neither the final payment nor any part of the retained percentage shall become due to the Contractor, until the Contractor delivers to the Owner a Certificate by the Clerk of Court of the Parish that the Owner's Substantial Completion Certificate has been recorded, more than 45 days has elapsed since the recordation, no liens have been recorded affecting this property, and all affidavits, consents and releases specified in these General Conditions."

9.10.2 Add this sentence at the end of the paragraph:

Upon receipt by the Architect of all Project close-out documents and a recommendation for acceptance of final completion, a close-out meeting will be scheduled by the Architect and Owner with the Contractor for the review and acceptance of all of the above identified items. Provided all items are complete and accepted by the Owner, the Owner will then authorize the issuance of the Final Payment.

9.11 LIQUIDATED DAMAGES

ADD 9.11

To the extent that such are due, owing, and payable to the Owner pursuant to the terms of the Contract, the Contractor and the Contractor's Surety agree and shall be liable for and pay to the Owner the sum stipulated in the Contract Documents as liquidated damages, which are to start on the first day after the final date of the contract and continue until the date of Substantial Completion, as issued by the Architect. Any liquidated damages shall be deducted from the remaining Contract Funds by a Construction Change Directive signed only by the Architect and Owner, or if no funds remain, to be paid by the Contractor or the Contractor's Surety.

In addition, if the "punch list" items are not complete before the end of the 45 day 'punch list' period, the contractor will be charged additional liquidated damages in an amount equal to half of the stipulated liquidated damages indicated in the Instructions to Bidders for this project. The Contractor shall also pay the expenses of the Architect as provided hereafter and 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 completed the Punch List, the Owner may, at its option, contract to have the balance of the Work completed and pay for such Work with 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 contracts with the owner. If the Surety fails to complete the Punch List within the stipulated time period, the Owner may not accept bonds submitted from the company in the future.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 Add the following sub-sections:

- .4 the indoor air quality of buildings where employees and visitors occupy the areas adjacent to or near the work on the Project site;
- .5 the exhaust systems and existing fresh air intake devices to prevent dust or fumes caused by the Work entering such systems; and
- .6 the Contractor expressly agrees that it is exclusively responsible for compliance with the Occupational Safety and Health Act (OSHA) and state and local regulations for the construction in that it is the "employer" within the meaning of those regulations. It is the expressed intent of the parties that the Contractor, not the Architect, nor the Owner are in charge of the Work. Any provision in the Contract Documents in conflict with this paragraph shall not be null and void.

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

After the last sentence, add the following:

Contractor shall provide for the marking of all underground utilities prior to any digging, excavation or other disturbance of earth and provide the Louisiana One Call reference number to the Architect and Owner.

10.2.9. SECURITY OF SITE

Contractor shall immediately make an oral report to the Architect and the Owner and promptly provide a written report to the Architect and Owner, about all accidents arising out of or in connection with the Work that cause death, injury, interrupts utility services or property damage.

10.3 HAZARDOUS MATERIALS

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

After the last sentence, add the following:

Mold is not considered to be hazardous for the purposes of this Section; however, the Contractor shall notify the Owner and the Architect, in writing, of the presence of any suspected black mold on building components in any affected area of the Project.

10.3.2 After the first sentence, delete all remaining sentences. Add at the end "When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. If appropriate, by Change Order or Change Directive, the Contract Time may be extended accordingly and the Contract Sum may be adjusted to allow for the Contractor's reasonable costs of shut-down, delay and start-up."

10.3.3 Delete Subparagraph 10.3.3.

10.4 EMERGENCIES

Delete Subparagraph 10.4 and substitute the following:

10.4 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

Add the following sentence to the end of 11.1.2: All policies and certificates of insurance of the Contractor/Subcontractor shall contain the following clauses:

11.1.2.1 The Contractor/Subcontractor's insurer will have no right of recovery or subrogation against the Owner, it being the intention of the parties that the insurance policies so affected shall protect both parties and the primary coverage for any and all losses covered by the below described insurance.

11.1.2.2 The Owner shall be named as an additional insured as regards negligence by the contractor (ISO Forms CG 20 10, Current form approved for use in Louisiana).

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

11.1.2.4 Any and all deductibles in the below described insurance policies shall be assumed by and be at the sole risk of the Contractor or Subcontractor.

Add the following behind section **11.1.3**:

The Contractor/Subcontractor, prior to commencing work, shall provide at his own expense, proof of the following insurance coverages required by the contract to the Owner in insurance companies authorized in the State of Louisiana. Operations to be performed by contract to be shown on the Certificate. Insurance is to be placed with insurers with an A. M. Best's rating of no less than "A" or above or be a qualified self-insured with "A" rated reinsurance; preference will be given to admitted (LIGA) insurers. This rating requirement will be waived for the workers' compensation coverage.

Thirty days prior notice of cancellation shall be given to the Owner by registered mail, return receipt requested, on all of the required coverage provided to the Owner. Ten day notice shall be required for cancellation due to non-payment. All notices will name the Contractor/ Subcontractor and identify the contract number.

Insurance coverage specified in the GENERAL CONDITIONS (AIA Document A201, 2007 Edition) to be provided by the Contractor, and any other insurance described below shall be furnished with the following minimum limits:

11.1.3.1 Workers' Compensation : \$1,000,000 limit required.

11.1.3.2 Commercial General Liability Insurance with a combined single limit per occurrence for bodily injury and property damage. This insurance shall include coverage for bodily injury and property damage, and indicate on the Certificate of Insurance which of the seven (7) coverages required below is not included in the policy, if any:

- 1 Premises - Operations;
- 2 Broad Form Contractual Liability;
- 3 Products and Completed Operations;
- 4 Use of Contractors and Subcontractors;
- 5 Personal Injury;
- 6 Broad Form Property Damage;
- 7 Explosion, Collapse and Underground (XCU) Coverage.

NOTE: On the certification of insurance, under the description of operations, the following wording is required: THE AGGREGATE LOSS LIMIT APPLIES TO EACH PROJECT, or a copy of ISO form CG2503 (Current form approved for use in Louisiana) shall be submitted.

Note: the Products and Completed Operations shall not have a sunset clause.

COMBINED SINGLE LIMIT (CSL) - AMOUNT OF INSURANCE REQUIRED

Type of Construction	Projects under \$1,000,000	Projects Over \$1,000,000

New Buildings/Renovations:

-Each Occurrence/ Minimum Limit	\$1,000,000	\$3,000,000
-Aggregate (Applicable to this Contract ONLY)	\$2,000,000	\$6,000,000

Renovations: *The building(s) value for this Project will be identified in the Contract documents.*

11.1.3.3 Business Automobile Liability Insurance with a combined single limit of \$1,000,000 per occurrence for bodily injury and property damage, unless otherwise indicated. This insurance shall include for bodily injury and property damage the following coverages:

- 1 Owned automobiles;
- 2 Hired automobiles;
- 3 Non-owned automobiles.

11.1.3.4 An Umbrella Policy may be used to meet minimum requirements.

11.1.4 INSURANCE REQUIREMENTS FOR CONTRACTORS

Contractor shall procure and maintain 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, his agents, representatives, employees or subcontractors. It is the Contractor's responsibility to assure that all coverages required in this contract are obtained and maintained through the completion of the project. This also includes extended coverages for periods beyond the contract terms when appropriate. The cost of such insurance shall be included in the Contractor's bid.

11.1.4.1 MINIMUM SCOPE OF INSURANCE

Coverage shall be at least as broad as:

11.1.4.1.1 Insurance Services Office Commercial General Liability coverage ("occurrence") form CG 0001. (Current form approved for use in Louisiana.) "Claims Made" form is unacceptable. The "occurrence form" shall not have a "sunset clause".

11.1.4.1.2 Insurance Services Office form number CA 0001 (Current form approved for use in Louisiana.) covering Automobile Liability. The policy shall provide coverage for owned, hired, and non-owned coverage. If an automobile is to be utilized in the execution of this contract, and the vendor/contractor does not own a vehicle, then proof of hired and non-owned coverage is sufficient.

11.1.4.1.3 Workers' Compensation insurance as required by the Labor Code of the State of Louisiana, including Employers Liability insurance.

11.1.4.2 MINIMUM LIMITS OF INSURANCE

Contractor shall maintain limits no less than that provided in the previous subsections.

11.1.4.3 DEDUCTIBLES AND SELF-INSURED RETENTIONS

Any deductibles or self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Owner, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

11.1.4.4 OTHER INSURANCE PROVISIONS

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

11.1.4.4.1 General Liability and Automobile Liability Coverages

11.1.4.4.1.1 The Owner, its officers, officials, employees, Boards and Commissions 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. The coverage shall contain no special limitations on the scope of protection afforded to the Owner, its officers, officials, employees or volunteers. It is understood that the business auto policy under "Who is an Insured" automatically provides liability coverage in favor of the owner.

11.1.4.4.1.2 Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the Owner, its officers, officials, employees, or volunteers.

11.1.4.4.1.3 The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

11.1.4.4.2 All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the Owner.

11.1.4.5 VERIFICATION OF COVERAGE

Contractor shall furnish the Owner with certificates of insurance effecting coverage required. 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 reviewed by the Owner before work commences. The Owner reserves the right to require complete, certified copies of all required insurance policies, at any time.

Delete section 11.2 – Owner's Liability Insurance

Delete section 11.3 (and all sub-sections 11.3.1 through 11.3.10) – Property Insurance, and replace entire section with the following:

11.3.1 The Contractor shall purchase and maintain property insurance upon the entire work included in the contract for an amount equal to the greater of the full-completed value or the amount of the construction contract including any amendments thereto .

The general contractor's policy shall provide "ALL RISK" Builder's Risk insurance (extended to include the perils of wind, collapse, vandalism/malicious mischief, and theft, including theft of materials whether or not attached to any structure.) The "All Risk" Builder's Risk Insurance must also cover architects' and engineers' fees that may be necessary to provide plans and 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 those repair and/or replacements.

The policy must include the interest of the Owner, Contractor and Subcontractors.

All property losses shall be made payable to and adjusted with the Owner.

11.3.2 All policies of insurance shall be approved by the Owner and Owner Insurance advisor prior to the inception of any work.

11.3.3 Other insurance required is as follows:

11.3.3.1 Owner's Protective Liability Insurance shall be furnished by the Contractor and naming the Owner as the Insured.

	Projects Under \$1,000,000	Projects Over \$1,000,000
CSL - Each Occurrence	\$1,000,000	\$3,000,000

11.3.3.2 Asbestos Abatement Liability-(required when asbestos abatement is included in the work)

The contractor or subcontractor who will be doing the asbestos abatement as outlined in this contract shall obtain and maintain such liability coverage for the asbestos abatement hazard and exposure with minimum limits of \$1,000,000 per occurrence for the duration of the project. The policy shall name the State of Louisiana, all State departments, agencies, boards and commissions as an additional insured for the project. The policy shall be written on an "occurrence" form without a sunset clause. Claims-made coverage is unacceptable. The insurance company shall have an A.M. Best rating of at least A-:VI or better. (pertains to this section only)

11.3.3.3 If, at any time, any of the said policies shall be or become unsatisfactory to the Owner, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the Owner, the Contractor/Subcontractor shall promptly obtain a new policy, submit the same to the Owner for approval and submit a certificate thereof as hereinabove provided.

Upon failure of the Contractor/Subcontractor to furnish, deliver and maintain such insurance as above provided, this contract, at the election of the Owner, may be forthwith declared suspended, discontinued or terminated.

Failure of the Contractor/Subcontractor to take out and/or to maintain or the taking out and/or maintenance of any required insurance, shall not relieve the Contractor/Subcontractor from any liability under the contract, nor shall the insurance requirements be construed to conflict with the obligations of the Contractor/Subcontractor concerning indemnification.

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

11.3.4 RISKS AND INDEMNIFICATIONS ASSUMED BY THE CONTRACTOR Neither the acceptance of the completed work nor payment therefore shall release the Contractor/Subcontractor from his obligations from the insurance requirements or indemnification agreement.

11.3.4.1 Additional insurance may be required on an individual basis for extra hazardous contracts and specific service agreements.

If such additional insurance is required for a specific contract, that requirement will be described in the "Special Conditions" of the contract specifications.

11.3.4.2 If any of the Property and Casualty insurance requirements are not complied with at their renewal dates, payments to the Contractor/Subcontractor will be withheld until those requirements have been met, or at the option of the Owner, the Owner may pay the Renewal Premium and withhold such payments from any monies due the Contractor/Subcontractor.

11.3.5 SUBCONTRACTORS

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates from each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

11.3.6 CERTIFICATE OF INSURANCE

Contractor shall furnish the Owner with certificates of insurance affecting coverage required by this clause. 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 of insurance must also contain the following in the "Description of Operations" section:

The certificates are to be provided to the Owner within 15 days of the award of the contract and prior to the signing of the contract.

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

11.4 PERFORMANCE AND PAYMENT BOND

11.4.1 Delete the phrase, "The Owner shall have the right to require the Contractor to" and replace with the phrase, "The Contractor shall".

Add the following Subparagraph **11.4.3**:

11.4.3 RECORDATION OF CONTRACT AND BOND [38:2241A(2)]

Within thirty (30) days of the execution of the Contract Between Owner and Contractor, the Contractor shall record the Contract and the Performance and Payment Bond with the Clerk of Court of Ascension Parish. The Contractor shall also provide the owner with a copy of the Standard Recorded contract.

11.5 OTHER INSURANCE or FAILURE TO OBTAIN REQUIRED INSURANCE

The contractor has the right to purchase coverage or self-insure any exposures not required by the bid specifications or contract documents, but shall be held liable for all losses, deductibles, self-insurance for coverages not required.

Contractor shall also be liable for any losses that occur where insurance is contractually required but not procured or purchased by the Contractor or permitted to lapse or be cancelled.

11.6 STATUS OF EMPLOYEES OF CONTRACTOR AND SUBCONTRACTORS - STATUTORY EMPLOYER STATUS

11.6 STATUTORY EMPLOYER STATUS

All Contractors must comply with the directives of Act 315 of the 1997 Louisiana Regular Session regarding guidelines for determining statutory employer status under La R.S. 23:1061, effective June 17, 1997, and in consideration thereof:

ARTICLE 12
UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

12.2.2.1 At the end of the paragraph add the following sentences:

“If the Contractor fails to correct Work identified as defective and covered by warranties, the Owner may hold the Contractor in default. If the Owner finds the Contractor is in default, the Surety shall be notified.

Finding the Contractor in default shall constitute a reason for disqualification of the Contractor from bidding on future APSB contracts.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Delete the remainder of the paragraph beginning after the word “located”

13.2 SUCCESSORS AND ASSIGNS

13.2.1 In the second sentence, Delete "Except as.....13.2.2,"

13.2.2 Delete paragraph.

13.4 RIGHTS AND REMEDIES

Add the following clause 13.4.3.

13.4.3 The 23rd Judicial District Court in and for the Parish of Ascension, State of Louisiana shall have sole and exclusive jurisdiction and venue in any action brought under or pertaining to this contract. All disputes between the parties shall be filed in the state court of Louisiana.

In the event of diversity for purposes of federal court jurisdiction or any other cause of action that may allow for federal court jurisdiction or venue, the Contractor, its surety, its Subcontractors and suppliers specifically waive any right or cause of action to be filed, transferred, removed, or tried in any federal court.

13.5 TESTS AND INSPECTIONS

13.5.1 In Subparagraph 13.5.1 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 sentence of Subparagraph 13.5.1.

13.6 INTEREST

Delete Paragraph 13.6.

13.7 TIME LIMITS ON CLAIMS

Delete paragraph 13.7. (See La. R.S. 38:2189)

13.8 Add 13.8 as follows:

13.8 PROGRESS AND COORDINATION MEETINGS

13.8.1 A Pre-Construction meeting shall be held prior to the start of the Work. The following shall be in attendance: Owner, Architect and Consultants, Contractor and Superintendent, major Sub-contractors and representatives of separate Contractors, when applicable. The Contractor shall submit to the Architect and Owner prior to or at the preconstruction meeting the following: (1) list of major Sub-contractors and their contact information, (2) a list of Sub-contractors' Superintendent and Project Manager with 24 hour phone numbers and (3) tentative (CPM) Construction Progress Schedule and submittal schedule. There will be no substitutions made to the Sub-Contractor List after submitting at the preconstruction meeting without written approval by Owner's Representative, after requested in writing by the Contractor.

13.8.2 Progress and coordination meetings will be held monthly on site or as charged in writing by the Owner or Architect. The Architect shall generate and distribute minutes of each meeting to all participants within seven (7) days of each meeting. The following are expected to attend: The Contractor represented by its Project Manager or principal, the Contractor's Project Superintendent, the Sub-contractors and material suppliers requested by the Owner or Architect.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete clause 14.1.1.4.

14.1.3 After the word "profit", add the following "for Work completed prior to stoppage". Add at the end of the sentence: The Contractor shall not be entitled to recover consequential damages or profit or overhead for any portion of the Work of the Contract that has not been performed.

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following clause:

14.2.1.5 "Fails to complete the punch list within the lien period as provided in section 9.8."

14.2.3 Add the following sentence:

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

14.2.3.1 Add the following:

Liquidated damages have been established and the termination by the Owner under this Article will not relieve the Contractor and/or Surety of their obligations under the liquidated damages provision of the Contract. The Contractor and/or Surety shall be liable to the Owner for per diem liquidated damages. Termination by the Owner shall not suspend assessment of liquidated damages against the Contractor or the Surety.

14.2.4 After the word “damages” in Line 2, add: “, *including, but not limited to, liquidated or stipulated damages*”.

14.2.5 Add the following Subparagraph:

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

ARTICLE 15 CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.1 In the first sentence of subparagraph 15.1.1, add the phrase “extension of time,” after the word “money”.

15.1.2 Add the following to the end of the paragraph:

The Initial Decision Maker (IDM) shall provide a written decision to the Contractor and the Owner within 21 days of receipt of the claim. The IDM may (1) approve the Claim or (2) reject the Claim in whole or part. The IDM’s decision is final and binding on the parties but subject to litigation. A “Reservation of Rights” and similar stipulations shall not be recognized under this contract as having any effect. Any party making a claim must make a claim as defined herein within the time limits provided.

15.1.3 In the second sentence of the subparagraph, delete “the decisions of the Initial Decision Maker” and replace with “his/her decision”.

15.1.5.1 Delete second sentence.

15.1.5.2 Delete paragraph 15.1.5.2 and substitute the following:

In planning the construction schedule within the agreed Contract Time, it shall be understood that the Contractor has anticipated the amount of adverse weather conditions normal to the Project site of the Work for the season or seasons of the year involved. Only those weather delays attributed to other than normal weather conditions will be considered by the Architect and Owner. 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. Documentation must include National Weather Service reports, Daily Log Reports and general description of work planned, that could not be executed. Note that half days will be considered and the Contractor will be allowed consideration of time lost due cleaning the site. An increase in the contract time due to weather shall not be cause for an increase in the contract sum.

15.1.5.3 Add the following Subparagraph:

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

January 11 days May 5 days September 4 days

February	<u>10</u>	days	June	<u>6</u>	days	October	<u>3</u>	days
March	<u>8</u>	days	July	<u>6</u>	days	November	<u>5</u>	days
April	<u>7</u>	days	August	<u>5</u>	days	December	<u>8</u>	days

Normal anticipated adverse rainfall as indicated above for the area of the Project site shall not be cause for an extension of the Contract Time. The Contractor shall anticipate the number of days specified above as a minimum number of days of rain per month with additional wet adverse work conditions following the above number of days of rainfall. 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.

All Contractor requests and documentation for extension in Time for rain or wet conditions for a particular month shall be delivered to the Architect promptly prior to the second Tuesday of the following month. (For example, for a claim for rain days in July, if the first day of August is on a Tuesday, the second Tuesday is August 8, hence, all requests for rain days in July would be delivered to the Architect on or prior to August 8. No consideration will be granted by the Owner for claims for rain days when the Contractor does not submit claims on time as specified above.

15.1.6 Claims for Consequential Damages

Delete this paragraph in its entirety.

15.2 INITIAL DECISION

Note that per this agreement, the ARCHITECT shall serve as the INITIAL DECISION MAKER.

15.2.1 In sentence two, delete the phrase, “unless otherwise indicated in the Agreement.”

15.2.3 Delete the last sentence.

15.2.5 From the second sentence, delete the phrase, “and the Architect, if the Architect is not serving as the Initial Decision Maker”

15.2.5 At the end of the third sentence, change “binding dispute resolution” to “litigation”.

15.2.6 Delete the phrase, “subject to the terms of Section 15.2.6.1.”

15.2.6.1 Delete this section in its entirety.

15.2.8 Delete this section in its entirety.

15.3 MEDIATION

Delete and replace with:

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 and 9.10.5, may be subject to mediation as a condition precedent to filing a lawsuit.

15.3.2 The parties may endeavor to resolve their Claims by mediation [non-binding] which, unless the parties mutually agree otherwise, shall be administered by a Mediation Service with offices in the parish of the project. 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 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.

15.4 ARBITRATION

15.4.1 Delete this section.

15.4.2 Delete this section.

15.4.3 Delete this section.

NOTE: Disputes arising under this contract are not subject to arbitration. The word arbitration in the contract documents is hereby deleted and revised/ changed to "litigation" wherever the word arbitration may be found.

15.4.4 CONSOLIDATION OR JOINDER

Delete sections 15.4.4.1 through 15.4.4.3 and replace with the following:.

15.4.4.1 The Owner, Architect, and Contractor grant to each other and to any other interested party all rights to joinder and consolidation that exist in the fact or law.

Add the following as Article 16:

ARTICLE 16 EQUAL OPPORTUNITY

16.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or for any other reason. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

16.2 The Contractor and all Subcontractors shall, in all solicitations or advertisement for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

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.

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. Submittals may be rejected for not complying with requirements.

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. Submittals 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 resubmittals, 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 resubmittals.
 - 1. Initial Review: Allow **15 days** for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - 4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the work to permit processing.
- D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 6 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label 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 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). 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. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. 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.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review received from sources other than Contractor.
1. Transmittal Form: Use AIA Document G810 or similar form approved by Architect.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked "Approved" or "Approved as noted."
- I. 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.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect.

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. Standard Color Charts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Testing by recognized testing agency.
 - 4. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.
- 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.
 - 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 24 by 36 inches (750 by 1000 mm).
 - 3. Number of Copies: Submit two opaque (bond) copies of each submittal. Architect will return one copy.

- 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 three 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 return submittal with options selected.
 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: Submit three sets of Samples. Architect will retain two 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.
1. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
- F. 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.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit two 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. 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.
- M. 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.

- N. 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."
- O. 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.

2.3 DELEGATED DESIGN

- 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 three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. 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.

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.
- C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

END OF SECTION 013300

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Work phases.
 - 3. Work under other contracts.
 - 4. Use of premises.
 - 5. Owner's occupancy requirements.
 - 6. Specification formats and conventions.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: New Fire Station and New Headquarters Building
 - 1. Project Location: 522 Robert Boulevard, Slidell, LA 70458
- B. Owner: St. Tammany Fire Protection District No. 1
 - 1. Owner's Representative: Chris Kaufmann
- C. Architect: Domain Architecture
- D. The Work consists of the following:
 - 1. New wood framed fire station & 2 story headquarters building
- E. Project will be constructed under a single prime contract.

1.3 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to areas indicated on drawings. (Do not disturb any wetlands area)

1.4 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "Master Format" numbering system.
 - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

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. Alternate No. 1: Shall include all work associated with pipe storage storm water detention, as outlined on sheet C2.1 and associated details.

- B. Alternate No 2: Contractor shall break out price to include all landscape work shown in the documents and Landscape (L) series sheets.

END OF SECTION 012300

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 01 Section "Unit Prices" for 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, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

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 time specified in Proposal Request or 20 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests

1.4 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.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittals Schedule, and Contractor's Construction Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Submit draft of AIA Document G703 Continuation Sheets.
 - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Progress payments shall be submitted to Architect by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- 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 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittals Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.

7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
 13. Performance and payment bonds.
 14. Data needed to acquire owner's insurance.
- H. 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 designated portions of the Work.
- I. 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. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

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 Drawings.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFIs).

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 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.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.

7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 SUBMITTALS

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 24 by 36 inches (750 by 1000 mm).
3. Number of Copies: Submit two opaque copies of each submittal. Architect will return one copy.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.5 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. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 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: Discuss items of significance that could affect progress, prepare the meeting agenda
 3. Minutes: Record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
- D. Progress Meetings: Conduct progress meetings at biweekly intervals. 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.
 3. Minutes: Record 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.

1.6 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.

5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. Hard-Copy RFIs:
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modifications."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PRODUCTS (Not Used)

EXECUTION (Not Used)

PART 2 - 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. Daily construction reports.
 - 3. 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.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
- 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. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show 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.

- B. Daily Construction Reports: Submit copies at monthly intervals.
- C. Field Condition Reports: Submit 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 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for 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.
 - 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 necessary days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

- D. 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.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. 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 construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 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. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at 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.

END OF SECTION 013200

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. See Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of

manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.
- J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.6 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including

service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Does not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

- C. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA)
CFR	Code of Federal Regulations
CRD	Handbook for Concrete and Cement
DOD	Department of Defense Military Specifications and Standards
DSCC	Defense Supply Center Columbus (See FS)
FED-STD	Federal Standard (See FS)
FS	Federal Specification
FTMS	Federal Test Method Standard (See FS)
ICC-ES	ICC Evaluation Service, Inc.
MIL	(See MILSPEC)
MIL-STD	(See MILSPEC)
MILSPEC	Military Specification and Standards
NES	National Evaluation Service (See ICC-ES)
UFAS	Uniform Federal Accessibility Standards

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

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 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
- C. See Division 31 Section "Dewatering" for disposal of ground water at Project site.

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 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 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.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement: Comply with Division 32, pavement Sections.
- B. 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 concrete galvanized steel bases for supporting posts.
- C. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
- D. 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.
- E. Insulation: 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.

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 and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations at contractor's option.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

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.
 - 1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- 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.
- C. 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.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. 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.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead, unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- G. 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.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

- I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

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. 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.

- C. 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.

- D. Project Identification and Temporary Signs: Provide Project identification and other signs. 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.

- E. 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 01 Section "Execution" for progress cleaning requirements.

- F. 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.

- G. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate..

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 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: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- 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: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from 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. 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 on site campus completely.
 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.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.
- D. Substitution Requests shall only be accepted during bidding and shall be required to obtain prior approval status.

1.2 DEFINITIONS

- 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
- 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
- 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.3 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles. Substitutions shall not be allowed after Bidding.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

- a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution.
- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
1. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 2. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 3. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
 4. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
 5. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
 6. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or

texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received up to 7 days before bids are due. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - 2. Requested substitution does not require extensive revisions to the Contract Documents.
 - 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - 4. Substitution request is fully documented and properly submitted.
 - 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - 7. Requested substitution is compatible with other portions of the Work.
 - 8. Requested substitution has been coordinated with other portions of the Work.
 - 9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. General installation of products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. See Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

- A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- B. Certified Surveys: Submit two copies signed by professional engineer.
- C. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before submitting a bid & constructions, verify the location and points of connection of utility services. Additional fees shall not be considered for lack of visiting the site prior to bidding.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. See Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
- C. See Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.2 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operating elements include the following:
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PRODUCTS

1.5 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

EXECUTION

1.6 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

1.7 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

1.8 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

PART 2 - END OF SECTION 017329

SECTION 017700 - 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.
- B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- E. See Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- F. See Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

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 and photographic negatives, damage or settlement surveys, 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 heat and other 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 01 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. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection 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 three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first.
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 (215-by-280-mm) 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. 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - i. 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.
 - j. Remove labels that are not permanent.
 - k. 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.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Replace parts subject to unusual operating conditions.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. 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.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. 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 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Emergency manuals.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.
- B. See Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

- A. Manual: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for type of emergency, emergency instructions, and emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, flood, gas leak, water leak, power failure, water outage, equipment failure, and chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
- B. Descriptions: Include the following:

1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures,

maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
- D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions and demonstration and training videotape if available, that detail essential maintenance procedures:
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
- F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- C. See Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.2 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up Record Prints.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Order, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. See Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.
- D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
 2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
 3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
 4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
 5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
 6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
 7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
 8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
1. Owner will furnish an instructor to describe Owner's operational philosophy.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
1. Schedule training with Owner through Architect, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral demonstration performance-based test.

END OF SECTION 017900

SECTION 02 11 10 – SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade and below-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.

1.2 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Notify utility locator service for area where Project is located before site clearing.

1.4 LIMITS OF CLEARING

- A. The limits of site clearing shall encompass the entire property with the exception of a 20 foot no cut buffer that shall be maintained along the rear of the property.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: As specified in Section 02300 - Earthwork.

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 EXECUTION

3.1 PREPARATION

- A. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.

- C. Protect existing site improvements to remain from damage during construction.
- D. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

- A. Erect and maintain a temporary orange fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
- B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted. Arrange to provide temporary utility services.
- C. Excavate for and remove underground utilities indicated to be removed.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 002111

SECTION 02 20 00 – EARTHWORK

PART 1 - SUMMARY

1.1 PROJECT INFORMATION

- A. This Section includes the following:
 - 1. Preparing subgrades.
 - 2. Excavating and backfilling.
 - 3. Base course for concrete walks and pavements.

1.2 PROJECT CONDITIONS

- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Backfill and Fill: Satisfactory soil materials that meet criteria of base course and as specified in drawings.
- C. Base Coarse:
 - 1. Concrete Pavement – Select sand fill being non-plastic and free of roots, clay lumps and other deleterious materials shall meet the requirements of LSSRB section 1003.07. The sand base shall be compacted to at least 95 percent of it's maximum dry density determined by ASTM D698 (Standard Proctor) within 3 percent of the optimum moisture content.
 - 2. Crushed Limestone: Shall comply with Section 1003.4 and shall be placed in accordance with Section 401.05 of the Louisiana Standard Specifications for Roads and Bridges.
 - 3. Non-Granular Backfill: Can be acceptable material from the site.

4. Bedding: Bedding for concrete pipe shall be crushed rock or gravel. Bedding for PVC pipe shall be granular material.
5. Backfill: Backfill for pipe and drainage structures shall be clean river sand.
6. Structural Fill: Structural fill should consist of sandy clays or clayey sands having a maximum liquid limit of 40 and plasticity index of 18 percent. The fill shall be placed in maximum lifts of eight (8) inches and compacted to at least one (1) percentage point below and three (3) percentage points above the optimum moisture content. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by diskings or scarifying. The fill should be compacted to at least 95 percent of the maximum dry density determined by ASTM D698 (Standard Proctor) within 3 percent of the optimum moisture content. Adequate drainage should be provided prior to and during site work. The site should be graded to promote rapid runoff.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other Hazards created by earthwork operations. Provide protective insulating materials as necessary.
- 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. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.2 EXCAVATION

- E. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- F. Excavate for structures, pavements, and walks to indicated elevations and dimensions. Extend excavations for placing and removing concrete formwork, for installing services and other construction, and for inspections. Trim bottoms to required lines and grades to leave solid base to receive other work.

- G. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working 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.
 - 1. Excavate trenches 6" deeper than bottom of pipe elevation for pipe 18" diameter and smaller, 12 inches deeper for all other pipe, to allow for bedding course. Hand excavate for bell of pipe.
- H. Proof roll subgrades, before filling or placing aggregate courses, with heavy pneumatic-tired equipment weighing about 20 tons to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades. The proof rolling to be witnessed by a representative of the Geotechnical Engineer and should be performed during a period of dry weather.
- I. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
- J. 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 may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.
- K. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

3.3 BACKFILLS AND FILLS

- L. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
 - 1. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
 - 2. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- M. Fill: Place and compact fill material in layers to required elevations.
- N. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. 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.

- O. Compaction: Place backfill and fill 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.
- P. Compact soil to not less than the following percentages of maximum dry density according to ASTM D-698.
 - 1. Under parking areas and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.
 - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.
- Q. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus ½ inch.
- R. Subbase and Base Courses: Under pavements and walks, place subbase course on prepared subgrade. Place base course material over subbase. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D-698.

3.4 FIELD QUALITY CONTROL

- S. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- T. Allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- U. 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 to depth required; recompact and retest until specified compaction is obtained.

3.5 PROTECTION AND DISPOSAL

- V. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- W. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.

- X. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- Y. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 002200

SECTION 02 50 10 – PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. All work performed under this section shall be in accordance with Sections 601, 706, 707, 901 and 1005 of the Louisiana Standard Specifications for Roads and Bridges 2006 Edition (and latest revisions) unless herein specified or indicated on the plans. This Section includes Portland Cement Concrete Pavement for the following applications:
 - 1. Pavement, Curbs and Walkways.
 - 2. Joints.

1.2 SUBMITTALS

- B. Product Data: For each manufactured material and product indicated.
- C. Design Mixes: For each concrete mix indicated.
- D. Material certificates.

1.3 QUALITY ASSURANCE

- E. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- F. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Steel reinforcement shall be in accordance with Sections 806 and 1009 of the Louisiana Standard Specifications for Roads and Bridges 2006 Edition (and latest revisions).

2.2 CONCRETE MATERIALS

- B. Concrete Materials shall be in accordance with Sections 901 of the Louisiana Standard Specifications for Roads and Bridges 2006 Edition (and latest revisions).

PART 3 - EXECUTION

3.1 CURBS

- A. Curbs. If slip-formed, the concrete shall have not more than a 1-1/2" slump and an air entraining admixture in accordance with the Standard Specifications referred to above.

3.2 SIDEWALKS

- B. The concrete shall be deposited on a moist sub-grade, struck off and compacted to the required thickness. The surface shall be finished with a wood float or steel trowel, provided that the surface is finally brushed in order to leave a slightly rough finish.
- C. The sidewalk shall be divided into sections by control joints, spaced 5 no more than feet apart, which shall extend into the concrete for at least 1/4 of the depth and shall be approximately 1/8" wide. Construction joints of 1/4" pre-molded expansion joint shall be installed around all appurtenances; such as manholes, utility poles, etc., extending and through sidewalk. Expansion joints of 1/2" thick performed joint filler (non-extruding type) or redwood shall be installed every 20 feet or fraction thereof, between intersecting sidewalks, and any fixed structure such as building, bridge or curbing. This expansion joint material shall extend for the full depth of the walk.
- D. Wire fabric where required shall conform to ASTM A-185.

3.3 CONCRETE PAVEMENT

- E. The P.C.C. Pavement thickness shown on the plans are minimum thickness. There will be no tolerance for thickness deficiencies. The Owner reserves the right to require removal and replacement of all pavement that does not meet the minimum required thickness. There will be no adjustment of payment for pavement exceeding the minimum required thickness. Concrete surface shall be finished with a light to medium broom to leave a slightly rough finish.

3.4 JOINTS

- F. All joints shall be installed in accordance with the details in the plans and using materials in accordance with Section 1005 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition

3.5 TESTING

- G. All testing and inspection shall be in accordance with Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, and latest revisions.

3.6 REPAIRS AND PROTECTION

- H. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- I. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
- J. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 002501

SECTION 02 50 20 – PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hot applied pavement joint sealants in the following locations.
 - 1. Portland cement concrete pavement expansion and contraction joints.

1.2 SUBMITTALS

- B. Product Data: For each product indicated.
- C. Samples: For each type and color of joint sealant indicated.
- D. Product certificates.
- E. Sealant compatibility and adhesion test reports.

1.3 QUALITY ASSURANCE

- F. Sealant Compatibility and Adhesion Testing: Use sealant manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 MATERIALS – GENERAL

- B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

1. Primers: Product recommended in writing by joint sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from sealant compatibility and adhesion tests and prior experience.
- C. Colors of Exposed Joint Sealants: Match samples
- D. 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.
 1. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.
 2. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
 3. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.3 HOT-APPLIED JOINT SEALANTS

- E. Elastomeric Sealant for Concrete: ASTM D 3406.
 1. Products:
 - a. Crafcro, Inc.; Superseal 444/777.
 - b. Meadows, W. R., Inc.; POLY-JET 3406.
 - c. Or Equal
- F. Sealant for Concrete and Asphalt: ASTM D 3405.
 1. Products:
 - a. Crafcro Inc.; ROADSAVER 221.
 - b. Koch Materials Company;
 - c. Meadows, W. R., Inc.; SEALTIGHT HI-SPEC.
 - d. Or Equal

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Clean out joints immediately before installing joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or recommended in writing by joint sealant manufacturer, based on sealant compatibility and adhesion tests and prior experience. Confine primers to areas of joint-sealant bond; do not spill primers or allow them to migrate onto adjoining surfaces.
- C. Sealant Installation: Comply with applicable recommendations in ASTM C 1193.
- D. Install backer materials to support sealants during application and at position required to produce 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 absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- E. Install sealants at same time backer materials are installed.
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths optimize sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants 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 sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- G. Clean excess sealants or sealant smears adjacent to joints as installation progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 002502

SECTION 02 66 00 - TESTING OF PIPELINES

PART 1 - GENERAL

1.01. SCOPE OF WORK

- A. Furnish all labor, materials, tools, equipment and related items required to perform pressure and leakage testing of pressure pipelines.

1.02. REFERENCE SPECIFICATIONS

- A. American Water Works Association (AWWA), latest edition:
 - 1. AWWA C600 – AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 2. AWWA C605 – AWWA Standard for Underground Installation of PVC Pressure Pipe and Fitting for Water.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01. GENERAL

- A. Field-test the entire length of installed pressure lines for water tightness.
- B. Conduct hydrostatic pressure and leakage tests on all pressure pipelines.
- C. Furnish all labor and equipment, including test pump with regulated by-pass meters and gauges, required for conducting pipeline tests. Furnish equipment and necessary piping as required to transport water used in testing from source to test location.
- D. Schedule time and sequence of testing, subject to observation and approval by the Owner and the Engineer. Provide adequate labor, tools and equipment to operate valves. Coordinate all valve operation with the Owner. Locate and repair any leaks discovered during the initial filling of the pipeline or during the course of the tests.

3.02. CLEANING

- A. At the conclusion of the work, thoroughly clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Remove debris cleaned from the lines from the low end of the pipeline. Remove all obstructions after cleaning. After the pipelines are cleaned and if the groundwater level is above the pipe or following a heavy rain, the Engineer will examine the pipes for leaks. Repair any defective pipes or joints.

3.03. TEST PROCEDURES FOR PRESSURE PIPELINES

- A. GENERAL

1. After laying pipe and consolidating backfill, subject all newly laid pipe or any valved section thereof, to hydrostatic pressure testing. Conduct the pressure testing for the duration as described below, unless otherwise specified or noted on the Drawings. Disconnect all meters, fixtures, devices or appliances, which are connected to the pipeline system and which might be damaged if subjected to the specified test pressure. Plug or cap the ends of branch lines during the testing procedures.
2. Fill each valved (capped or plugged) section of pipe slowly with water and expel all air. If permanent air vents are not located at all high points, install corporation or blow-off cocks at such points to expel air as filling takes place. After expelling all air, close the cocks and keep the pipe filled until tested. Examine all exposed pipe, fittings, valves, hydrants and joints while under test pressure, and stop all visible leaks. Remove and replace any cracked or defective pipe, fittings, valves or hydrants discovered during testing. Replace the damaged pipe or appurtenances and repeat the testing to the satisfaction of the Owner.

B. Hydrostatic Leakage Tests

1. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
2. Determine leakage by recording the quantity of water pumped into the pipeline through a standard water meter of a size appropriate to secure an accuracy of ± 2 percent at the average flow rate pumped. The Engineer must approve other methods of measuring the quantity of water pumped prior to commencing the hydrostatic test. Pressurize the pipeline to a least 50-percent (50%) above normal operating or working pressure of the system, but never less than the minimum test pressures listed below. Maintain the test pressure for a period of two (2) hours.

<u>Piping Description</u>	<u>Test Pressure</u>
Potable Water Piping	150 psi
Sewer Force Main	100 psi

3. Calculate allowable leakage for the types of pipe used as follows:
 - a. Cast Iron, Ductile Iron, and PVC Pipe. Allowable as permitted by AWWA C600, "Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances", which is not to exceed that determined by the formula:

$$L = \frac{(SD\sqrt{P})}{133,200} \quad \text{Where:}$$

L = the allowable leakage, in gallons per hour

S = the length of pipeline tested, in feet

D = the nominal diameter of the pipe, in inches

P = the average test pressure during the leakage tests, in psi gauge

4. In the event any section of the tested line fails to meet the above specified requirements for water tightness, determine and remedy the cause of the excessive leakage at no additional cost to the Owner, including retesting if required.

3.04. FINAL ACCEPTANCE

- A. The Owner will not accept pipe installation until the Contractor has repaired all known leaks, whether or not leakage is within allowable limits. Locate and repair all leaks at no additional cost to the Owner.
- B. The Owner's representative will certify successful completion of all required pressure and leakage tests before the pipeline is accepted.

3.05. WATER SOURCE

- A. Unless otherwise noted in the plans, notify the Owner a minimum of 72 hours prior to obtaining water for testing purposes.

END OF SECTION 002660

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SECTION 02 66 50 - WATERLINES AND ACCESSORIES

PART 1 - GENERAL

1.01. WORK INCLUDED

- A. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the waterline in substantial conformance with the lines, grades, and locations shown on the Drawings.
- B. High density polyethylene pipe is covered in Section 02650 – Horizontal Directional Drilling.
- C. Pressure testing of waterlines is covered in Section 02660 – Testing of Pipelines.
- D. Valves are covered in Section 15100 – Valves.

1.02. REFERENCED SPECIFICATIONS

- A. Those parts of the referenced specifications which are applicable hereto shall be considered as if written herein in full.
- B. ASTM: American Society of Testing Materials.
- C. AWWA: American Water Works Association.

1.03. SUBMITTALS

- A. Complete shop drawings and product data and engineering data for all products shall be submitted to the Engineer in accordance with the requirements of Section 01300 of these Specifications.
- B. The Contractor shall submit written certification from the manufacturer(s) that the products furnished comply with all applicable requirements of these Specifications.

1.04. TRANSPORTATION AND HANDLING

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing pipe, fittings, valves and accessories. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification. Pipe handled on skids shall not be rolled or skidded against the pipe on the ground.
- B. Handling: Handle pipe, fittings, valves and accessories carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front end loader. Do not use material damaged in handling. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior coatings or internal lining of the pipe.

1.05. STORAGE AND PROTECTION

- A. Store all pipe that cannot be distributed along the route. Use suitable storage areas.

- B. Stored materials shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.
- C. Pipe shall not be stacked higher than the limits recommended by the manufacturer. The bottom tier shall be kept off the ground on timbers, rails or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two rows of timbers shall be placed between tiers and chocks, affixed to each other in order to prevent movement. The timbers shall be large enough to prevent contact between the pipe in adjacent tiers.
- D. Stored mechanical and push-on joint gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.
- E. Mechanical-joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

PART 2 - PRODUCTS

2.01. DUCTILE IRON FITTINGS

- A. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi. Fittings shall be recommended by the manufacturer for use with C-900 pipe. Fittings shall be cement lined in accordance with AWWA C104 and shall be furnished with a fusion bonded epoxy coating and lining meeting the requirements of AWWA C116 and AWWA C213.
- B. Joints for fittings:
 - 1. Unless shown or specified otherwise, joints shall be standard mechanical restrained joints for fittings. Mechanical joints shall conform to AWWA C111.
 - 2. Restrained joints shall be ductile iron retainer glands, Megalug Series 2000 as manufactured by EBBA Iron, Inc., or equal. Castings shall be furnished with a fusion bonded coating and meeting the requirements of AWWA C116 and AWWA C213.
 - 3. Provide the appropriate gaskets for mechanical joints.
 - 4. Bolts for submerged service shall be stainless steel machine bolts conforming to ASTM A193, Grade B8M. Nuts shall be heavy hex, stainless steel conforming to ASTM A194, Grade B8M.

2.02. POLYVINYL CHLORIDE PIPE - AWWA TYPE

- A. Polyvinyl chloride pipe (PVC) shall have belled ends for push-on type jointing and shall conform to AWWA C900 or C905, ductile iron pipe equivalent (DIPS) outside diameters. The pipe shall have a Dimension Ratio (DR) of 18 and shall be capable of withstanding a working pressure of 235 psi. Pipe shall be supplied in minimum lengths of 20 feet. Pipe shall be approved for potable water use by the National Sanitation Foundation (NSF) and shall conform to NSF 61.
- B. Restrained joints for PVC pipe, as required, shall be retainer glands, Megalug Series 2000 PV as manufactured by EBAA Iron, Inc., or approved equal. Assembly shall be designed to withstand a pressure of 250 psi.

- C. The Contractor shall install a plastic bonded solid 16 gauge copper wire on the top of all PVC waterlines. The wire shall be continuous along the entire length of the pipe and grounded to gate valves, fire hydrants, and flushing valves.
- D. Each length of pipe shall be labeled "NSF Approved" or "NSF-61", "AWWA C905", "DR-18", and the pipe diameter.

2.03. VALVE BOXES

- A. All valves shall be equipped with valve boxes and a vault in traffic areas. Valve boxes shall be cast iron two-piece screw type with drop covers as manufactured by Mueller, Kennedy, M&H or approved equal. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. Valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that the bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Valve vaults shall be HS-20 rated. Covers shall have "WATER" cast into them. Valve boxes shall be manufactured in the United States.

2.04. PLUGS AND CAPS

- A. The Contractor shall provide, install, and remove standard plugs or caps as required for testing. Plugs and caps shall be suitable for permanent service.
- B. The Contractor shall plug, cap or otherwise cover all piping work in progress.
- C. Permanent plugs shall be restrained mechanical joint ductile iron.

2.05. TRANSITION COUPLINGS/ADAPTORS

- A. Between different types of pipe and/or fittings special couplings or adapters may be required to provide proper connection. Some of these may be indicated on the Drawings or specified with individual types of pipe. However it is the Contractor's responsibility to ensure proper connection between various types of pipe, and between pipe and valves, fittings and other appurtenances. The Contractor shall provide all adapters as required for a functioning pipeline, whether specifically noted or not.
- B. Couplings and adapters shall be suitable for direct bury, with proper dielectric insulation (if necessary) and if metallic and not stainless steel, with two coats of high solids epoxy.

2.06. CONCRETE

- A. Cast in place concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C94. Reinforcing steel shall conform to the requirements of ASTM A615, Grade 60. Precast concrete shall have a compressive strength of not less than 5,000 psi.

2.07. DETECTION TAPE

- A. Detection tape shall be composed of a solid aluminum foil encased in a protective plastic jacket. Tapes shall be color coded in accordance with APWA color codes with the following legends: Water Systems, Safety Precaution Blue, "Caution Water Line Buried Below". Colors may be solid or striped. Tape shall be permanently printed with no surface printing allowed. Tape width shall

be a minimum of 2-inches. Detection tape shall be equal to Lineguard Type III Detectable, or Allen Systems Detectatape, or equal.

2.08. FIRE HYDRANTS

- A. New fire hydrants shall be a three-way Mueller Centurion No. A 423, Kennedy Guardian, American Darling B-84-B, Clow Medallion, or approved equal with a 5 1/4" valve opening. The length of the lower section of each hydrant shall be appropriate for the depth of the water main. All new hydrants shall be painted chrome yellow. Fill reservoir and lubricate all caps and threads with approved lubricant.

PART 3 - EXECUTION

3.01. EXISTING UTILITIES AND OBSTRUCTIONS

- A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Owner. The Contractor shall call the Louisiana One Call Center (1-800-272-3020) as required by Louisiana Law and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
 - 1. Provide the required notice to the utility owners and allow them to locate their facilities according to Louisiana law. Field utility locations are valid for only 10 days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.
 - 2. Expose the facility, for a distance of at least 80 feet in advance of pipeline construction, to verify its true location and grade. Repair, or have repaired, any damage to utilities resulting from locating or exposing their true location.
 - 3. Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.
 - 4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer with an updated copy of the log monthly, or more frequently if required.
- C. Conflict with Existing Utilities
 - 1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tying-back, supporting, or temporarily suspending service of the parallel or crossing facility. The Contractor may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.

2. Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The Contractor may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the Engineer. Where such relocation of the water main is denied by the Engineer, the Contractor shall arrange to have the utility, main, or service relocated.
 - D. Electronic Locator: The Contractor shall have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.
 - E. Water and Sewer Separation
 1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. If neither of these two separation criteria is possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.
 2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
- 3.02. CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS
- A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of Plaquemines Parish with reference to construction operations, safety, traffic control, road maintenance and repair.
 - B. Construction Operations
 1. Perform all work along highways, streets and roadways to minimize interference with traffic.
 2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
 3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.
 4. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
 - C. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.

- D. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
- E. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The Contractor shall take extreme care in moving landscape features and promptly re-establishing these features.
- F. Maintaining Highways, Streets, Roadways and Driveways
 - 1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.
 - 2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
 - 3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. The grader or front-end loader shall be available at all times.
 - 4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the work.

3.03. PIPE DISTRIBUTION

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No street or roadway may be closed for unloading of pipe without first obtaining permission from Plaquemines Parish or LADOTD. The Contractor shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- C. No distributed pipe shall be placed inside drainage ditches.
- D. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than 15 feet from the roadway pavement, including shoulders, as measured edge-to-edge.

3.04. LAYING AND JOINTING PIPE AND ACCESSORIES

- A. Lay all pipe and fittings to accurately conform to the lines and grades established by the Engineer.
- B. Pipe Installation
 - 1. Proper implements, tools and facilities shall be provided for the safe performance of the work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to materials and protective coatings and linings. Under no circumstances shall waterline materials be dropped or dumped into the trench.

2. All pipe, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the materials.
 3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.
 4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
 5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
 6. Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be used.
 7. Detection tape shall be buried 6 to 12-inches deep but no less than 2 feet above the pipe.
- C. Alignment and Gradient
1. Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
 2. Maintain a transit, level and accessories on the job to layout angles and ensure that deflection allowances are not exceeded.
- D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave un-jointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress, If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either push-on, mechanical joint, restrained joint or as approved by the Engineer.
- E. Joint Assembly: Push-on and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.
- F. Cutting Pipe: Cut PVC pipe using a suitable saw; remove all burrs and smooth the end before jointing. The Contractor shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location.
- G. Valve and Fitting Installation
1. Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks, Defective valves shall be corrected or held for inspection by the Engineer. Valves shall be closed before being installed.

2. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.
3. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on compacted crushed stone, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 30-inches beneath finished grade so as to set the top of the operating nut 30-inches below finished grade. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the Engineer.
4. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

3.05. JOINT RESTRAINT

- A. Retainer Glands: Provide retainer glands where shown on the Drawings and on all associated fittings and valves. Retainer glands shall be installed in accordance with the manufacturer's recommendations, particularly, the required torque of the set screws. The Contractor shall furnish a torque wrench to verify the torque on all set screws which do not have inherent torque indicators.

3.06. DISINFECTING PIPELINE

- A. After successfully pressure testing each pipeline section, disinfect in accordance with the Louisiana Sanitary Code and these Specifications.
- B. Specialty Contractor: Disinfection shall be performed by an approved specialty contractor. Before disinfection is performed, the Contractor shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.
- C. Chlorination
 1. Apply chlorine solution to achieve a concentration of at least 50 milligrams per liter free chlorine in new line. Retain chlorinated water for 4 hours.
 2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 4 hour period.
 3. After 4 hours, all samples of water shall contain at least 50 milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.
- D. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual. Flush all lines until residual is equal to existing system residual in the area.

- E. Bacteriological Testing: After final flushing and before the water main is placed in service, the Contractor shall collect samples from the line and have tested for bacteriological quality in accordance with the rules of the Louisiana Department of Health and Hospitals (LADHH). The bacteriological samples shall be analyzed for both coliform and non-coliform growth. Testing shall be performed by a laboratory certified by the LADHH. Two or more successive sets of samples, as required by the LADHH, taken at 24 hour intervals, shall indicate bacteriologically satisfactory water and the results shall be submitted to the LADHH. Re-chlorinate lines until required results are obtained.

3.07. PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
 - 1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
 - 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
 - 3. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
- B. Man-Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work, except as absolutely necessary and as approved by the Engineer. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

END OF SECTION 002665

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SECTION 02 72 00 – STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes storm drainage outside the building.
- B. Roof Drain connections and cleanouts.

1.2 PERFORMANCE REQUIREMENTS

- C. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

1.3 SUBMITTALS

- D. Product Data: For pipe, cleanouts, precast drop inlets and drainage structures, as applicable.
- E. Shop Drawings: For precast concrete inlets and other structures, including frames, covers, and grates, as applicable.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Reinforced Concrete Pipe
 - 1. Pipe shall comply with Sections 1006.03, 1006.04, 1006.05b and 1006.06 of the Louisiana Specification for Roads and Bridges, 2006 edition.
 - 2. Pipe shall have type 2 joints.
- B. PVC Pipe
 - 1. Pipe shall comply with Section 1006.07 of the Louisiana Specification for Roads and Bridges, 2006 Edition.

2.2 CATCH BASINS AND MANHOLES

- C. Normal-Traffic, Pre-cast Concrete Drop Inlets and Manholes:
 - 1. Shall comply with Section 702 of the Louisiana Specification for Roads and Bridges, 2006 Edition.
- D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service. 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.

2.3 CLEANOUTS

- E. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, backfilling, and identification materials and their installation are specified in Division 2 Section "Earthwork."

3.2 SPECIAL PIPE COUPLINGS

- B. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

3.3 INSTALLATION, GENERAL

- C. 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 design considerations into account. Install piping as indicated, to extent practical.
- D. 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. Maintain swab or drag in line, and pull past each joint as it is completed.
- E. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- F. Use 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.
- G. Install gravity-flow piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 2. Install piping with 12-inch minimum cover.

- H. Extend storm drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

3.4 PIPE JOINT CONSTRUCTION AND INSTALLATION

- I. Join and install pipe and fittings according to installations indicated.
- J. PVC Pipe and Fittings: As follows:
 - 1. Pipe shall be installed in accordance with Section 701 of the Louisiana Specification for Roads and Bridges, 2006 Edition.
- K. Reinforced Concrete Pipe and Fittings
 - 1. Pipe shall be installed in accordance with Section 701 of the Louisiana Specification for Roads and Bridges, 2006 Edition.
 - 2. Pipe joints shall be wrapped with 36" wide geotextile fabric centered on the joint.
- L. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

3.5 DROP INLET AND MANHOLE INSTALLATION

- M. Set frames and grates to elevations indicated.

3.6 ROOF DRAIN CLEANOUT INSTALLATION

- N. Install cleanouts and riser extension from drain pipe to cleanout at grade. Install piping so cleanouts open in direction of flow in drain line pipe
- O. Install drains in locations indicated. Cleanouts should be installed as close to downspout as practical.
- P. Use commercially manufactured fittings for piping connections.

3.7 FIELD QUALITY CONTROL

- Q. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 12 inches of backfill is in place, and again at completion of Project.
 - 1. 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. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

3. Re-inspect and repeat procedure until results are satisfactory.

3.8 PROTECTION AND CLEANING

R. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

END OF SECTION 002720

SECTION 02 80 00 – SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes sanitary sewerage outside the building.

1.2 PERFORMANCE REQUIREMENTS

- B. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.
- C. Force-Main Pressure Ratings: At least equal to system operating pressure, but not less than 150 psig.

1.3 SUBMITTALS

- D. Product Data: For the following:
 - 1. Gravity Sewer Piping
 - 2. Sewer Force Main Piping

1.4 PROJECT CONDITIONS

- E. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
- C. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPING MATERIALS

- D. Refer to Part 3 "Piping Applications" Paragraph for applications of pipe and fitting materials.

2.3 PIPES AND FITTINGS

- E. Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, gray iron, for gasketed joints.

1. Gaskets: ASTM C 564, rubber, compression type, thickness to match class of pipe.
- F. Ductile-Iron Sewer Pipe: ASTM A 746, for push-on joints.
1. Standard-Pattern, Ductile-Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
 2. Compact-Pattern, Ductile-Iron Fittings: AWWA C153, for push-on joints.
 3. Gaskets: AWWA C111, rubber.
- G. PVC Sewer Pipe and Fittings: According to the following:
1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: AWWA C-900, for solvent-cemented or gasketed joints.
 2. Gaskets: ASTM F 477, elastomeric seals.

2.4 MANHOLES

- H. Normal-Traffic Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for rubber gasketed joints.
1. Diameter: 48 inches, minimum, unless otherwise indicated.
 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
 3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
 4. Riser Sections: 4-inch minimum thickness and lengths to provide depth indicated.
 5. Top Section: Eccentric-cone type, unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 6. Gaskets: ASTM C 443, rubber.
 7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch diameter frame and cover.
 8. Steps: Fiberglass, individual steps or ladder. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into base, riser, and top section sidewalls with steps at 12- to 16-inch intervals. Omit steps for manholes less than 60 inches deep.

9. Steps: ASTM C 478, individual steps or ladder. Omit steps for manholes less than 60 inches deep.
10. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- I. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch diameter cover. Include indented top design with lettering "SANITARY SEWER" cast into cover.
- J. Manhole Cover Inserts: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.

1. Manufacturers:

FRW Industries, Inc.
Knutson Manufacturing Co.
Parson Environmental Products, Inc.
Or Equal

2. Type: Solid.

2.4 CONCRETE

- K. General: Cast-in-place concrete according to ACI 318, ACI 350R, 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.
- L. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio.
 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- M. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious materials ratio. 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.
 - a. Invert Slope: 1 percent through manhole.
 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.
- N. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious materials ratio.
1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- 2.5 PROTECTIVE COATINGS
- O. Description: One- or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:
1. Concrete Manholes: On exterior and interior surfaces.
 2. Manhole Frames and Covers: On entire surfaces.
- 2.6 BACKWATER VALVES
- P. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
1. Manufacturers:

Josam Co.
McWane, Inc.; Tyler Pipe; Wade Div.
Smith, Jay R. Mfg. Co.
Watts Industries, Inc.; Ancon Drain Div.
Watts Industries, Inc.; Enpoco, Inc. Div.
Zurn Industries, Inc.; Hydromechanics Div.
Or Equal
 2. Horizontal Type: With swing check valve and hub-and-spigot ends.
 3. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.
 4. Terminal Type: With bronze seat, swing check valve, and hub inlet.
- Q. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.
1. Manufacturers:

Canplas, Inc.
IPS Corp.
NDS, Inc.
Plastic Oddities, Inc.
Sioux Chief Manufacturing Co., Inc.
Or Equal

2.6 CLEANOUTS

- R. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:
1. Light Duty: In earth or grass foot-traffic areas.
 2. Medium Duty: In paved foot-traffic areas.
 3. Heavy Duty: In vehicle-traffic service areas.
 4. Extra-Heavy Duty: In roads.
 5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- S. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."
- B. Identification: Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges 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.
- C. Piping Applications: Include watertight joints.
1. NPS 4 and NPS 6: PVC sewer pipe and fittings, gaskets, and gasketed joints.
 2. NPS 8 and NPS 10: PVC sewer pipe and fittings, gaskets, and gasketed joints.

- D. Sleeve-Type Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
- E. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- F. 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 using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- G. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- H. Use 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.
- I. Install gravity-flow piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
 - 1. Install piping pitched down in direction of flow, at minimum slope of 0.4 percent, unless otherwise indicated.
 - 2. Install piping with 36-inch minimum cover.
- J. Extend sanitary sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- K. Pipe Joint Construction and Installation: Join and install pipe and fittings according to installations indicated.
 - 1. Refer to Division 2 Section "Utility Materials" for basic piping joint construction and installation.
 - 2. PVC Sewer Pipe and Fittings:
 - 3. Join pipe and gasketed fittings with gaskets according to ASTM D3034, SDR 35 for gravity sewer. Join pipe and fittings with gaskets according to ASTM D1869 for sewer force main (Class 160, SDR 26).
 - 4. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

- L. Manhole Installation: Install complete with appurtenances and accessories indicated.
 - 1. Form continuous concrete channels and benches between inlets and outlet.
 - 2. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
 - 3. Install precast concrete manhole sections with gaskets according to ASTM C 891.
- M. Concrete Placement: Place cast-in-place concrete according to ACI 318 and ACI 350R.
- N. Install backwater valves in piping where indicated.
- O. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- P. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- Q. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.
- R. Make connections to existing piping and underground structures so finished Work complies as nearly as practical with requirements specified for new Work.
- S. 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
- T. 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.
- U. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- V. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
 - 1. Place plug in end of incomplete piping at end of day and when work stops.

2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

3.2 FIELD QUALITY CONTROL

- W. 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. 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. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
2. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
3. Reinspect and repeat procedure until results are satisfactory.

- X. 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 authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
 - a. Sanitary Sewerage: Perform hydrostatic test.
 - i. Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during 24-hour period.
 - ii. Close openings in system and fill with water.
 - iii. Purge air and refill with water.
 - iv. Disconnect water supply.

- v. Test and inspect joints for leaks.
 - vi. Option: Test ductile-iron piping according to AWWA C600, Section "Hydrostatic Testing." Use test pressure of at least 10 psig.
- 6. Sanitary Sewerage: Perform air test according to UNI-B-6.
 - 7. Manholes: Perform hydraulic test according to ASTM C 969.
 - 8. Leaks and loss in test pressure constitute defects that must be repaired.
 - 9. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 002800

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
 - 1. 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.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301 (ACI 301M).

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II.

2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C 330/C 330M, 1/2-inch nominal maximum aggregate size.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and 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 C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C 94/C 94M and potable.

2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 15 mils thick.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- 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 C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.8 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, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.
- C. Admixtures: Use admixtures according to 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.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.45
 - 3. Slump Limit: 5 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- B. Suspended Slabs: Lightweight concrete.
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Calculated Equilibrium Unit Weight: 115 lb/cu.ft. as determined by ASTM C 567/C 567M.
 - 3. Slump Limit: 5 inches , plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 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.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

3.2 EMBEDDED ITEM INSTALLATION

- 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction 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 contraction cracks.

- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. 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. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

- 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

- 1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

- 1. 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.

- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

- 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches

adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces indicated 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.
 - 2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where indicated While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed 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.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during 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.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

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 masonry units.
- 2. Decorative concrete masonry units.
- 3. Clay face brick.
- 4. Building (common) brick.
- 5. Mortar and grout.
- 6. Steel reinforcing bars.
- 7. Masonry-joint reinforcement.
- 8. Ties and anchors.
- 9. Embedded flashing.
- 10. Miscellaneous masonry accessories.
- 11. Masonry-cell fill.

- B. Products Installed but not Furnished under This Section:

- 1. Steel lintels in unit masonry.
- 2. Steel shelf angles for supporting unit masonry.
- 3. Cavity wall insulation.

- C. Related Requirements:

- 1. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Decorative CMUs, in the form of small-scale units.
 - 2. Clay face brick, in the form of straps of five or more bricks.
- D. Samples for Verification: For each type and color of the following:
 - 1. Exposed CMUs.
 - 2. Clay face brick, in the form of straps of five or more bricks.
 - 3. Special brick shapes.
 - 4. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - 2. Include data on material properties.
 - a. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - b. For exposed brick, include test report for efflorescence according to ASTM C 67.
 - c. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing according to ASTM C 67.

- d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 4. Mortar admixtures.
 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
 7. Joint reinforcement.
 8. Anchors, ties, and metal accessories.
- D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups for each type of exposed unit masonry construction typical exterior wall in sizes approximately 60 inches (1500 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup wythes and accessories.
 - a. Include a sealant-filled joint at least 16 inches (400 mm) long in Exterior wall mockup.
 - b. Include lower corner of window opening, at upper corner of exterior wall mockup. Make opening approximately 12 inches (300 mm) wide by 16 inches (400 mm) high.
 - c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of exterior wall mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit masonry above half of flashing).
 - d. Include wood studs, sheathing, water-resistive barrier, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.
 2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
 3. Clean exposed faces of mockups with masonry cleaner as indicated.
 4. Protect accepted mockups from the elements with weather-resistant membrane.

5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3050 psi (14.8 MPa) or as noted on Structural drawings.
 - 2. Density Classification: Normal weight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 - 5. Faces To Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.
- C. Decorative CMUs: ASTM C 90.
 - 1. Exterior CMO veneer 4" thick / 8" thick
 - 2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 - 3. Density Classification: Normal weight.
 - 4. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
 - 5. Pattern and Texture:
 - a. Scored vertically so units laid in running bond appear as square units laid in stacked bond, standard finish. Match Architect's samples.
 - 6. Colors: As selected by Architect from manufacturer's full range.

2.5 MASONRY LINTELS

- A. General: Provide one of the following:
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay Face Brick: Facing brick complying with ASTM C 216.
 - 1. Grade: SW.
 - 2. Type: FBS.
 - 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi (23.10 MPa).
 - 4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67.
 - 5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - 6. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.
 - 7. Application: Use where brick is exposed unless otherwise indicated.
 - 8. Color and Texture: Medium brown, wire cut Full-range red, sand molded Buff, velour Match Architect's samples As selected by Architect.

2.7 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
- E. Mortar Cement: ASTM C 1329/C 1329M.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- G. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Addiment Incorporated; Mortar Kick
 - 2. Euclid Chemical Company (The); Accelguard 80.
 - 3. Grace Construction Products, a unit of W. R. Grace & Co- Conn.; Morset
 - 4. Sonneborn, Div of ChemRex; Trimix-NCA
- I. Water: Potable.

2.8 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: galvanized carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm)
 - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm).
 - 5. Wire Size for Veneer Ties: 0.148-inch (3.77-mm).

6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 7. Provide in lengths of not less than 10 feet (3 m), .
- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.
- E. Masonry-Joint Reinforcement for Multiwythe Masonry:
1. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch (1.5 mm) and maximum vertical adjustment of 1-1/4 inches (32 mm). Size ties to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.

2.9 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.
1. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches (32 mm).
 2. Wire: Fabricate from 3/16-inch- (4.76-mm-), hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls unless otherwise indicated.
- D. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
1. Corrosion Protection: Epoxy coating 0.020 inch (0.51 mm) thick.
- E. Adjustable Masonry-Veneer Anchors:
1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
 2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- (1.90-mm-) thick steel sheet, galvanized after fabrication.

3. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel stainless-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.

2.10 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch (0.40 mm) thick.
2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. (4.9-kg/sq. m) weight or 0.0216 inch (0.55 mm) thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. (3.7-kg/sq. m) weight or 0.0162 inch (0.41 mm) thick.
3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond.
5. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
7. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
8. Solder metal items at corners.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Advanced Building Products Inc.: Copper Fabric Flashing
 - b. AFCO Products Inc.: Copper Fabric
 - c. Hohmann & Barnard, Inc.: H&B C-Fab Flashing
 - d. Phoenix Building Products; Type FCC-Fabric Covered Copper
 - e. Polytite Manufacturing Corp.; Copper Fabric Flashing
 - f. Sandell Manufacturing Co., Inc.; Copper Fabric Flashing
 - g. York Manufacturing, Inc.; York Copper Fabric Flashing

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 3. Where flashing is fully concealed, use flexible flashing.
- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.12 MASONRY-CELL FILL (Fill all open CMU Cavities)

- A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

2.13 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Diedrich Technologies, Inc.
 2. EaCo Chem, Inc.
 3. ProSoCo, Inc.

2.14 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For masonry below grade or in contact with earth, use Type S.
 2. For reinforced masonry, use Type S.
 3. For mortar parge coats, use Type S.
 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1.
 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet ((6 mm in 3 m),) or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed brick masonry in running bond do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs. For exposed CMU, install in a stack bond pattern.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches (100 mm) back to lap 8" (250mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
 - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- E. Cut joints flush where indicated to receive waterproofing, cavity wall insulation, air barriers unless otherwise indicated.

3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 4.5 sq. ft. (0.42 sq. m) of wall area spaced not to exceed 16 inches (406 mm) o.c. horizontally and 16 inches (406 mm) o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches (305 mm) of openings and space not more than 36 inches (915 mm) apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches (610 mm) o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
 - b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) ties to allow for differential movement regardless of whether bed joints align.
 2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
 3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Parge cavity face of backup wythe in a single coat approximately 3/8 inch (10 mm) thick. Trowel face of parge coat smooth.
- D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed tie sections connector sections and continuous wire in masonry joints.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.
 - 5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 25 inches (635 mm) o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. (0.25 sq. m) 3.5 sq. ft. (0.33 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.
 - 6. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.
- B. Provide not less than 2 inches (50 mm) 1 inch (25 mm) of airspace between back of masonry veneer and face of sheathing or insulation.
 - 1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.8 MASONRY-CELL FILL (All open CMU cells)

- A. Pour loose-fill insulation into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).
- B. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.9 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
 - 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.

3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches (200 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.
 3. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under water-resistive barrier, lapping at least 4 inches (100 mm).
 4. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.

5. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 6. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 7. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 8. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
 9. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use open-head joints to form weep holes.
 2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
 4. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
 5. Trim wicking material flush with outside face of wall after mortar has set.

3.12 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.13 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 6. Clean stone trim to comply with stone supplier's written instructions.
 7. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.15 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, testing agency.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Source quality-control reports.
- E. Field quality-control and special inspection reports.

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 CSE.

- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles: ASTM A 36/A 36M .
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Threaded Rods: ASTM A 36/A 36M.
 - 1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

- A. Primer: Comply with Section 099113 Exterior Painting.
- B. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
- C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, 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/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, 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 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. 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.

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 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

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 receive sprayed fire-resistive materials (applied fireproofing).
 - 4. Galvanized surfaces.
 - 5. Surfaces enclosed in interior construction.
- 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."
- 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. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections 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 are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedment's for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing 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.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

3.3 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 and AWS D1.8/D1.8M 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 maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds 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 are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Evaluation reports.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
 - 2. Deck Profile: As indicated
 - 3. Profile Depth: As indicated
 - 4. Design Uncoated-Steel Thickness: As indicated

2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), zinc coating.
- B. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- C. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- D. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- E. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- F. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- G. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

- C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- F. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- G. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld.
- H. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

3.3 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

END OF SECTION 053100

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Miscellaneous steel framing and supports.
 - 2. Shelf angles.
 - 3. Steel weld plates and angles.
 - 4. Miscellaneous steel trim.
 - 5. Metal bollards.
 - 6. Loose steel lintels.
 - 7. Elevator machine hoist beams.
 - 8. Metal ladders.
- B. See Division 05 Section "Decorative Metal" for ornamental metal items.
- C. See Division 05 Section "Decorative Metal Railings" for ornamental metal railings.

1.2 SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- B. Ferrous Metals:
 - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304, 316L.
 - 3. Steel Tubing: ASTM A 500, cold-formed steel tubing.

4. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

C. Nonferrous Metals:

1. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T6.
2. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.
3. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Type **304** stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
 1. Available Products:
 - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
 - b. Carboline Company; Carbozinc 621.
 - c. ICI Devoe Coatings; Catha-Coat 313.
 - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
 - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
 - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
 - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- E. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

2.5 FABRICATION

- A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
 2. Weld corners and seams continuously. 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. Finish exposed welds smooth and blended.
 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
 4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 24 inches (600 mm) o.c.
- B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
1. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches (600 mm) o.c.
 2. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.
- C. Loose Steel Lintels: Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
1. Lintels in Exterior Walls: Galvanize
- D. Shelf Angles: Fabricate shelf angles of sizes indicated and for attachment to framing. Fabricate with horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c.
1. Shelf Angles in Exterior Walls: Galvanize
 2. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.
- E. Metal Ladders
1. General:
 - a. Comply with ANSI A14.3
 - b. For elevator pit ladders, comply with ASME A17.1/CSA B44
 2. Steel Ladders:
 - a. Space siderails 16 inches apart unless otherwise indicated.
 - b. Siderails: continuous 3/8 by 2 1/2 inch steel flat bars, with eased edges.
 - c. Rungs: 3/4 inch steel bars.
 - d. Fit rungs in centerline of siderails: plug-weld and grind smooth on outer rail faces.
 - e. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

- f. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets and fasteners with zinc-rich primer.
- g. Galvanize ladders including brackets.
- h. Primary ladders, including brackets and fasteners with zinc-rich primer

F. Metal Bollards

- 1. Fabricate metal bollards from Schedule 40 steel pipe:

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.

B. Steel and Iron Finishes:

- 1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
- 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:
 - a. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- 3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
- 1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
 - 2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
 - 3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack solidly with nonshrink, nonmetallic grout.

- C. Bollards:
 - 1. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
 - 2. Fill bollards solidly with concrete, mounding top surface to shed water.
- D. Installing Miscellaneous framing and support.
 - 1. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instruction and requirements indicated on Shop Drawings.
 - 2. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article
 - a. Grout baseplates of columns supporting steel girders after girders are installed and leveled.
- E. Touch up surfaces and finishes after erection.
 - 1. Painted Surfaces: Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.
 - 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 05 51 13 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes steel stairs with concrete-filled treads.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete fill for stair pans.
 - 2. Section 055200 "Aluminum Railing Assemblies" for railing and handrails.

1.2 SUBMITTALS

- A. Product Data: For metal pan stairs and the following:
 - 1. Prefilled metal-pan-stair treads.
 - 2. Abrasive nosings.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For stairs, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following, or approved equal:
1. Alfab, Inc.
 2. American Stair, Inc.
 3. HDI Railing Systems
 4. Sharon Companies Ltd. (The).

2.2 PERFORMANCE REQUIREMENTS

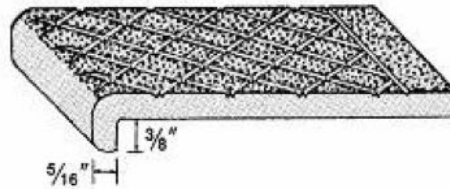
- A. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 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/360 or 1/4 inch (6.4 mm), whichever is less.

2.3 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components 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/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- D. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

2.4 ABRASIVE NOSINGS

- A. Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both.
1. Subject to compliance with requirements, products by one of the following below, or approved equal.
 - a. Type 101SP by Wooster.
 - b. Style 801SP by American Safety Tread.
 2. Configuration: Cross-hatched units, 3 inches (75 mm) wide with lip, concealed.



3. Fabricate units in lengths to accurately fit width of entire tread.
4. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

- B. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

2.5 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 1. Provide hot-dip, zinc-coated anchor bolts for anchoring into concrete.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2.6 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- C. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa) unless otherwise indicated.

- D. Non-slip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
- E. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated.

2.7 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, 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.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections 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.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.8 STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
 - 1. Fabricate stringers of steel plates or channels.

- a. Provide closures for exposed ends of channel stringers.
 2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch (1.7 mm).
1. Steel Sheet: Uncoated cold-rolled steel sheet.
 2. Directly weld metal pans to stringers; locate welds on top of sub-treads where they are concealed by concrete fill. Do not weld risers to stringers.
 3. Attach risers and sub-treads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 4. Shape metal pans to include nosing integral with riser.
 5. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platform framing.

2.9 STAIR RAILINGS

- A. Refer to Section 055200 Aluminum Railing Assemblies.

2.10 FINISHES

- A. Shop prime metal stairs after shop assembly.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cut, drill, and fit as required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. 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.
- E. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."
 - 1. Provide integral stain in concrete.
 - 2. Apply slip-resistive abrasive to concrete tread surface.
 - 3. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
- G. Field paint stair assemblies as described in Section 099000 Painting.

3.2 INSTALLING RAILINGS

- A. Refer to Section 055200 Aluminum Railing Assemblies.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

END OF SECTION 05 51 13

SECTION 05 52 00 - ALUMINUM RAILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes manufactured aluminum pipe and tube railing.
- B. Related Requirements:
 - 1. Section 055113 - Metal Pan Stairs

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Railings: Provide railings complying with requirements of ASTM E 985 for structural performance, based on testing performed according to ASTM E 894 and ASTM E 935.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data railings.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain railings through one source from a single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Blum: Julius Blum & Co., Inc., Carlstadt, NJ (800-526-6293; www.juliusblum.com).
 - 2. Braun, J. G., Company; a division of the Wagner Companies.
 - 3. CraneVeyor Corp., South El Monte, CA (626-442-1524)
 - 4. HDI Railing Systems
 - 5. Tuttle Railing Systems; Div. of Tuttle Aluminum & Bronze, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.

2.3 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
 - 1. Extruded Bar and Tube: ASTM B 221 (ASTM B 221M), alloy 6063-T5/T52.
 - 2. Extruded Structural Pipe and Tube: ASTM B 429, alloy 6063-T6.
 - 3. Drawn Seamless Tube: ASTM B 210 (ASTM B 210M), alloy 6063-T832.
 - 4. Plate and Sheet: ASTM B 209 (ASTM B 209M), alloy 6061-T6.
 - 5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), alloy 6061-T6.
 - 6. Castings: ASTM B 26/B 26M, alloy A356-T6.

- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.4 FASTENERS, AND ANCHORS

- A. Fasteners for Anchoring Railings: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails to other types of construction indicated and capable of withstanding design loads.
 - 1. For aluminum railing, use fasteners fabricated from Type 304 or Type 316 stainless steel.
- B. Fasteners for Interconnecting Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnecting components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for handrails indicated.
 - 2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Form changes in direction of railing members as follows:
 - 1. As detailed.
 - 2. By bending.
 - 3. By radius bends of radius indicated.
 - 4. By flush radius bends.
 - 5. By mitering at elbow bends.
 - 6. By inserting prefabricated flush-elbow fittings.
 - 7. By any method indicated above, applicable to change in direction involved.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- E. Connections: Fabricate railings with welded connections, unless otherwise indicated.
- F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
- H. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- I. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- J. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- K. Close exposed ends of handrail members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted railings, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.
- M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- E. Aluminum Finishes: Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
1. Class I, Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall construction, to verify that locations of concealed reinforcements have been provided.
- B. Make corrections to unsatisfactory conditions.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required to install railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Align rails so variations from level for horizontal members and from parallel with rake of steps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and for properly transferring loads to in-place construction.

3.3 ANCHORING POSTS

- A. Anchored into concrete where indicated or required. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
- B. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

3.4 RAILING CONNECTIONS

- A. Non-welded Connections: Use mechanical joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing end.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- C. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.
- D. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- E. Secure wall brackets to building construction.

3.6 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap. Rinse with clean water.

3.7 PROTECTION

- A. Protect finishes of handrails from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 00

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Framing with engineered wood products.
 - 3. Wood blocking and nailers.
 - 4. Wood furring and grounds.
 - 5. Plywood backing panels.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
 - 1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
- C. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 grade and any of the following species:
 1. Southern pine; SPIB.
 2. Mixed southern pine; SPIB.
- D. Framing Other Than Non-Load-Bearing Interior Partitions: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.
- E. Exposed Exterior Framing Indicated to Receive a Stained or Natural Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 1. As noted on the Drawings

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 1. Extreme Fiber Stress in Bending, Edgewise: 3100 psi (21.3 MPa) for 12-inch nominal- (286-mm actual-) depth members.
 2. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa).

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants.
 - 4. Furring.
 - 5. Grounds.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber with 19 percent maximum moisture content of any species.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and the following species and grades:
 - 1. Mixed southern pine, No. 3 grade; SPIB.

2.6 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners[with hot-dip zinc coating complying with ASTM A 153/A 153M] [of Type 304 stainless steel].
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.8 METAL FRAMING ANCHORS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by Simpson Strong Tie Co., Inc., or comparable products by one of the following:
 - 1. Alpine Engineering Products, Inc,
 - 2. KC Metals Products, Inc.
 - 3. USP Structural Conectors
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

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, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Subflooring
 - 4. Building paper.
 - 5. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
- B. Research/Evaluation Reports: For the following:
 - 1. Preservative-treated plywood.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPAC9.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood, unless otherwise indicated

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
- B. Glass-Mat Gypsum Wall Sheathing: ASTM C1177/1177M (fire rated locations)
- C. Type and thickness: Type X, 5/8 inch thick
- D. Size: 48 by 96 inches for vertical installation.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

2.5 ROOF SHEATHING

- A. Plywood Subflooring: Exterior, Structural 1 single floor panels or sheathing.
 - 1. Span rating: See structural drawings
 - 2. Nominal Thickness: not less than 23/32 inch (18.3 mm).
 - 3. Verify with structural drawings; structural drawings take president.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated.
 - 1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.7 WEATHER-RESISTANT ROOF COVERING

- A. Basis of Design: Self adhering roofing underlayment (under shingles): Ice & Water Shield by Grace; or comparable product by Carlisle or Tamko.

2.8 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

2.9 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants".
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, Compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads / m), of type recommended by sheathing and tap manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing or with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
 - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."
 - 1. Comply with "Code Plus" installation provisions in guide referenced in paragraph above.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Combination Subfloor-Underlayment:

- a. Glue and nail to wood framing.
 - b. Screw to cold-formed metal framing.
2. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 1. Fasten gypsum sheathing to wood framing with nails or screws.
 2. Install boards with 3/8 inch (9.5 mm) gap where non-load-bearing construction abuts structural elements.
 3. Install boards with a 1/4-inch (6.4mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5mm) from edges and ends of boards.
 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5mm) from edges and ends of boards.
 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.4 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.
- B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.
- C. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.5 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 - 1. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
 - 2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 - 3. Lap weather-resistant building paper over flashing at heads of openings.
 - 4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.6 PROTECTION

- A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim.
 - 2. Plastic-laminate cabinets.
 - 3. Plastic-laminate countertops.
 - 4. Granite countertops.
- B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

- A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- B. Samples:
 - 1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
 - 2. Plastic-laminates, for each type, color, pattern, and surface finish.
 - 3. Thermoset decorative panels, for each type, color, pattern, and surface finish.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of woodwork.

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 occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

- A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

A. Wood Products:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

B. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

D. Granite: Uba Tuba or similar as specified on drawings

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011

1. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2 1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.

D. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
2. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
3. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
4. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

E. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

2.5 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: Economy.
 - 2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
 - 3. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
- B. Interior Standing and Running Trim:
 - 1. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
 - 2. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- C. Plastic-Laminate Cabinets:
 - 1. AWI Type of Cabinet Construction: Reveal overlay on face frame
 - 2. Reveal Dimension: 1/2 inch (13 mm).
 - 3. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:
 - a. Horizontal Surfaces Other Than Tops: Grade HGS.
 - b. Postformed Surfaces: Grade HGP.
 - c. Vertical Surfaces: Grade HGS.
 - d. Edges: Grade HGS.
 - 4. Materials for Semiexposed Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - 5. Drawer Sides and Backs: Thermoset decorative panels.
 - 6. Drawer Bottoms: Thermoset decorative panels.
 - 7. Colors, Patterns, and Finishes: See Drawings.
- D. Granite Countertops:
 - 1. Solid Surfacing Material Thickness: 3 cm.
 - 2. Colors, Patterns, and Finishes: As indicated by manufacturer's designations
 - 3. Fabricate tops in one piece with loose backsplashes field application (refer to drawings for locations of backsplashes). Comply with industry standard's written recommendations for adhesives, sealers, fabrication and finishing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. 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.
- F. 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. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
- G. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.
- 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 (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips
- I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Concealed building insulation.
 - 2. Exposed building insulation.
 - 3. Loose-fill building insulation.
 - 4. Sound attenuation insulation.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product test reports.

1.3 QUALITY ASSURANCE

- A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS-FIBER BLANKET INSULATION

A. Available Manufacturers:

1. CertainTeed Corporation.
2. Guardian Fiberglass, Inc.
3. Johns Manville.
4. Knauf Fiber Glass.
5. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

C. Where glass-fiber blanket insulation is located in walls of the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated (fill wall cavity completely):

1. 3-1/2 inches (89 mm) thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
2. 3-5/8 inches (92 mm) thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
3. 5-1/2 inches (140 mm) thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F (3.7 K x sq. m/W at 24 deg C).
4. 10 inches (254 mm) thick with a thermal resistance of 30 deg F x h x sq. ft./Btu at 75 deg F (5.2 K x sq. m/W at 24 deg C).
5. All roof insulation shall be 10" thick continuous with R value of 30.

2.3 LOOSE-FILL INSULATION

A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

B. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5.

2.4 AUXILIARY INSULATING MATERIALS

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.

B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

2.5 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate or Angle formed from perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square, welded to

projecting copper-coated steel spindle 0.105 inch (2.67 mm) in diameter and of length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch- (38-mm-) square or diameter self-locking washers complying with the following requirements:

1. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness.
 2. Where anchors are located in ceiling plenums and attic spaces, protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.
- B. Chicken wire can be used to anchor insulation along the roof line of the wood framed structure.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness 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.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
 6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- D. Place loose-fill insulation into spaces indicated, either by pouring or by machine blowing, to comply with ASTM C 1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
1. For cellulosic-fiber loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's Special Report #3, "Standard Practice for Installing Cellulose Insulation."
- E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.3 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

- A. Install 3-inch- (76-mm-) thick, unfaced glass-fiber blanket insulation over suspended ceilings at partitions in a width that extends insulation 48 inches (1219 mm) on either side of partition.

END OF SECTION 072100

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fluid-applied membrane air barrier, vapor permeable.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 1. Include details of interfaces with other materials that form part of air barrier.
- C. Product certificates.
- D. Qualification data.
- E. Product test reports.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly 150 sq. ft. (14 sq. m),
- C. incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.

1. Allow 24 hours for architect inspection and revision of mock-up before proceeding with air barrier work.
- D. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. W.R. Grace, Perm-a-Barrier VP
 - b. Henry Company, Air-Bloc 31-MR
 2. Physical and Performance Properties:
 - a. Membrane Air Permeance: Not to exceed 0.004 cfm/ sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
 - b. Membrane Vapor Permeance: 10 to 20 perms; ASTM E 96. (Note: the products specified are vapor permeable).

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of air barrier material.
- C. Butyl Strip: Vapor-retarding, 30- to 40-mil- (0.76- to 1.0-mm-) thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.
- D. Modified Bituminous Strip: Vapor-retarding, 40-mil- (1.0-mm-) thick, smooth-surfaced, self-adhering; consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick polyethylene film with release liner backing.
- E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- F. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- G. Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

- H. Modified Bituminous Transition Strip: Vapor-retarding, 40-mil- (1.0-mm-) thick, smooth-surfaced, self-adhering; consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick polyethylene film with release liner backing.
- I. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil- (0.43-mm-) thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance of 37 perms (2145 ng/Pa x s x sq. m).
- J. Elastomeric Flashing Sheet: ASTM D 2000, 2BC415 to 3BC620, minimum 50- to 65-mil- (1.3- to 1.6-mm-) thick, cured sheet neoprene with manufacturer's recommended contact adhesives and lap sealant with stainless-steel termination bars and fasteners.
- K. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
- L. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C 1193 and with air barrier manufacturer's written instructions. Apply first layer of fluid air barrier membrane at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air barrier membrane over joint reinforcing strip.

3.2 TRANSITION STRIP INSTALLATION

- A. Install strips, transition strips, and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window

systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials [as indicated].

- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply manufacturer's approved transition strip/flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over both substrates. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.3 AIR BARRIER MEMBRANE INSTALLATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- C. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- D. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- E. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties. Per manufacturer's recommendations:
 - 1. Perm-a-Barrier: 90 mils wet thickness

2. Air-Bloc 31-MR: 120-200 mils wet thickness

- F. Apply strip and transition strip a minimum of 1 inch (25 mm) onto cured air membrane or strip and transition strip over cured air membrane overlapping 3 inches (75 mm) onto each surface according to air barrier manufacturer's written instructions.
- G. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- H. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.4 PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for more than 30 days.

END OF SECTION 072726

SECTION 07 31 13 - ASPHALT SHINGLE ROOFING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes shingle roofing, underlayments, and related accessories.
- B. Related Sections:
 - 1. Division 6 Section "Carpentry" for wood framing and sheathing.
 - 2. Roof metal drip edge and other sheet metal flashings are described in Section 07 60 00.

1.2 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.3 SUBMITTALS

- A. Submit product data for each type of product specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.
 - 1. Manufacturer's Warranty: Submit sample form copy.
- B. Manufacturer's Certification: Written certification stating that roofer/installer has met manufacturer's highest level qualifications and approved for installing product specified.
- C. Samples for Color Selection: Submit manufacturer's sample finishes showing the full range of colors and profiles available for each type of shingle indicated.
- D. Guarantees & Warranties: Submit completed and executed originals. Provide copies in the Manuals submitted at project closeout.

1.4 QUALITY ASSURANCE

- A. Installer: Installer has met manufacturer's highest level qualifications and approved for installing product specified, as defined and certified in writing by manufacturer.
- B. Fire-Test-Response Classification: Where products with a fire-test-response classification are specified, provide shingles identical to those tested according to ASTM E 108 or UL 790 and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify each bundle of shingles with appropriate markings indicating fire-test-response classification of applicable testing and inspecting agency.
- C. Wind-Resistance-Test Characteristics: Where wind-resistant shingles are indicated, provide products identical to those tested according to ASTM D 3161 or UL 997 and passed. Identify each bundle of shingles with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- C. Deliver materials in manufacturer's unopened bundles or containers with labels intact. Handle and store materials at Project site to prevent water damage, staining, or other physical damage. Store roll goods on end. Comply with manufacturer's recommendations for job-site storage, handling, and protection.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements, and when substrate is completely dry.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.7 ROOF SERVICE GUARANTEE

- A. Roof Service Guarantee: The roofing contractor shall furnish the Owner a roof service guarantee against faulty material or workmanship, or both.
 - 1. Period of Service Guarantee: 2 years from the date of substantial completion.
 - 2. Form: Service guarantee shall be in the exact form attached at the end of this Section.
 - 3. Number of Copies: Submit 2 copies, with original signatures by all parties.
- B. Terms of Roof Service Guarantee:
 - 1. During this period, he agrees to repair or replace all defects and generally to maintain the roofing and associated sheet metal in its original weathertight and watertight condition, all without cost to the Owner.
 - 2. During the maintenance period, the roofing contractor agrees that, within 24 hours of receipt of notice from the Owner, he will inspect and make immediate emergency repairs to defects and leaks threatening the interior of the building. He further agrees to effect permanent repairs to these defects or leaks within 30 days of said notice. Make above repairs without cost to the Owner.
 - 3. Make permanent restoration using proper laminar reconstruction with hot bitumen and reconstruction to the original condition using materials and methods originally specified.
 - 4. It is understood that the Owner reserves the prerogative of making immediate emergency repairs, at his own expense, to conditions threatening the building contents, before the notice or expiration of the 24 hour period, without abrogating his rights under this guarantee.
 - 5. Should temporary repairs not be made within 24 hours or permanent repairs within 30 days, then the Owner may employ others to make such corrections at the expense of either or both (jointly) of the signatories.

6. Roof service repairs shall be made in accordance with manufacturer's recommended procedures, with manufacturer's recommended materials.

1.8 MANUFACTURER'S WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years non-prorated.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Three-Dimensional, Fiberglass, Laminated Strip Shingles: Mineral-surfaced, self-sealing, laminated, multi-ply overlay construction, fiberglass-based, strip asphalt shingles, complying with both ASTM D 3018, Type I, and ASTM D 3462. Provide shingles with a Class A fire-test-response classification that pass the wind-resistance-test requirements of ASTM D 3161.
 1. Strip Size: Manufacturer's standard.
 2. Fungus Resistant: Provide shingles that have been surface treated to remain free of fungus and algae growth, which adversely affects the appearance of the roof, for at least 5 years.
 3. Hip and Ridge Shingles: Manufacturer's standard, factory-precut units to match asphalt shingles. High profile self sealing hip and ridge cap shingle matching the color of selected roof shingle.
 4. Colors, Blends, and Patterns: As selected by Architect from manufacturer's full range.
 5. Subject to compliance with requirements, provide one of the following:
 - a. Timberline by GAF.
 - b. Landmark by Certainteed.
 - c. Heritage by Tamko.

2.2 ACCESSORIES

- A. Felt Underlayment: Type II, 36-inch- (914-mm-) wide, asphalt-saturated organic felt, complying with ASTM D 226 (No. 30) or ASTM D 4869.
- B. Leak Barrier - Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Each Roll contains approx. 200 sf (18.5 sqm), 85 lbs (38.6 kg), 36 inches by 66.7 feet (914 mm by 20.33 m). 60 mils (1.5 mm) thick. Subject to compliance with requirements, provide product by one of the following:
 1. Carlisle Coatings & Waterproofing, Inc.
 2. Certainteed
 3. StormGuard by GAFMC

4. Ice-and-Water Shield by Grace, W. R. & Co. - Conn.
5. Polyguard Products, Inc.
6. Protecto Wrap Company.

- C. Granular-Surfaced Valley Lining: ASTM D 6380, Class M, organic-felt-based, asphalt roll roofing; 36 inches (914 mm) wide.
- D. Asphalt Plastic Cement: Non-asbestos fibrated asphalt cement, complying with ASTM D 4586.
- E. Bituminous Coating: Fed. Spec. TT-C-494 or SSPC Paint 12 solvent type bituminous mastic, nominally sulphur free, compounded for 15-mil dry film thickness per coat.

2.3 SHEET METAL

- A. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet, with a minimum thickness of 0.0625 inch (1.6 mm) except not less than 0.0937 inch (2.4 mm) thick for applications where burning (welding) is involved.
 1. Fabricate flashings for plumbing vent through roof from lead sheets.
- B. Stainless-Steel Sheet: ASTM A 167, Type 304, soft annealed, with No. 2D finish, except where harder temper is required for forming or performance; minimum 0.0187 inch (24 gage) (0.5 mm) thick, unless otherwise indicated.
 1. Fabricate roof drip edge strips from stainless steel.

2.4 FASTENERS

- A. Roofing Nails: ASTM F 1667; stainless-steel, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- B. Felt Underlayment Nails: Stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates, areas, and conditions, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.

- B. Clean substrates of projections and substances detrimental to application. Cover holes or other minor voids in substrate with sheet metal flashing secured with non-corrosive roofing nails. Drive projecting nails firmly home.
- C. Coordinate installation with flashings and other adjoining work to ensure proper sequencing. Do not install roofing materials until vent stacks and other penetrations through roof substrate have been checked that they are securely fastened against movement. Provide corrective action to secure these components.
- D. Make correction to unsatisfactory conditions.

3.2 UNDERLAYMENTS

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Self-Adhering Sheet Underlayment: Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install wrinkle free, on roof deck at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Hips: Extend 18 inches (450 mm) on each side.
 - 2. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot.
 - 3. Roof Slope Transitions: Extend 18 inches (450 mm) on each roof slope.
 - 4. Eaves: Extend continuously 18 inches (450 mm) along eaves.
- C. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves over self-adhering underlayment. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt underlayment nails.
 - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water. Lap ends of felt not less than 6 inches (150 mm) over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inch (900 mm) o.c.

3.3 SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch (13 mm) over fascia at eaves and rakes.
 - 2. Install starter strip along rake edge.

- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with a minimum number of roofing nails located according to manufacturer's written instructions.
- E. Ridge Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 - 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.4 SHEET METAL INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal 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 weatherproof.
- B. Sheet Metal Flashing: Install metal flashing and trim as indicated and according to details and recommendations of the "Asphalt Roofing" section of "The NRCA Steep Roofing Manual" and ARMA's "Residential Asphalt Roofing Manual."
- C. Metal Drip Edges: Fabricate from stainless steel. Provide continuous metal drip edge along the eaves of shingle roofing.
 - 1. Apply metal drip edge under the underlayment at eaves. Extend metal drip edges back from the edge of the deck not more than 3 inches (76 mm) and secure with nails spaced not more than 10 inches (254 mm) on center along the inner edge, unless indicated otherwise. Solder at corners.
- D. Vent-Through Roof Flashings: Provide sheet lead roof vent flashings where indicated.
 - 1. Cement metal flange to surface of the roofing ply with hot bitumen or flashing cement.

3.5 ADJUSTING

- A. Replace damaged materials installed under this Section with new materials that meet specified requirements.

END OF SECTION 07 31 00

(EXECUTE ON CONTRACTOR'S LETTERHEAD)

Date of Substantial Completion: _____

Contractor:

Project:

Building _____

MAINTENANCE AGREEMENT

We agree to maintain the roofing areas defined by this project for a period of two (2) years from the date of substantial completion. During that period, we will inspect and make temporary repairs to defects and leaks in the roof system within 48 hours of notification from STFD. As soon as weather permits, we will make permanent repairs to restore the affected areas to the standard of the Contract Documents. It is understood that all this work will be done without cost to APSB unless it is determined that the leaks and defects were caused by abuse, or by natural phenomena, or related work by others.

Signed -

Print/Typed Name and Title - Contractor's Authorized Representative

This Maintenance Agreement for 2 years and is valid until

Date: _____

SECTION 074213 - METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes concealed-fastener, lap-seam metal wall panels for exterior wall of the office building.
- B. Related sections:
 - 1. Metal wall panels for the Shop-warehouse portion of the Metal Building is specified in Division 13.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure of 20 lbf/sq. ft. (957 Pa), acting inward or outward.
 - 2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 of the span.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
- C. Samples: For each type of exposed finish required.
- D. Warranties: Samples of special warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Pre-installation Conference: Conduct conference at project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, 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.
- D. Retain strippable protective covering on metal panels during installation.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.7 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS (HORIZONTAL PATTERN)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Wave" Concealed Fastener Panel as provided by McElroy Metals/Architectural Building Components.
- B. Approved manufacturers:
 - 1. Berridge
 - 2. MBCI
 - 3. Alucobond
 - 4. ABC
 - 5. Approved Equal
- C. Factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
 - 1. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 2. Profile: Wave steel sheet, .30mm (22 ga)
 - 3. Surface: Smooth flat finish.
 - 4. Finish: As indicated. If not indicated, provide as follows:-

- a. Exposed Coil-Coated Finish: 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
- b. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

2.2 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.3 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that studs and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - 3. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Make corrections to unsatisfactory conditions.

3.2 PREPARATION

- A. Miscellaneous Framing: Install base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. Watertight Installation:
 - 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 - 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - 3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: 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 panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar

items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213

SECTION 074213.53 - METAL SOFFIT PANELS

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 metal soffit panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, 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.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa)
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METAL SOFFIT PANELS

- A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to

supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

- B. **Reveal-Joint-Profile Metal Soffit Panels:** Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with recessed reveal joint between panels.
1. **Basis of Design:** Subject to compliance with requirements, provide "Marquee-Lok" Concealed Fastener Panel as provided by McElroy Metals/Architectural Building Components.
 2. **Approved Manufacturers:**
 - a. Berridge
 - b. MBCI
 - c. Alucobond
 - d. ABC
 - e. Approved Equal
 3. **Metallic-Coated Steel Sheet:** Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 24 gauge
 - b. Exterior Finish: Three-coat fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's standard range
 4. **Panel Coverage:** 12 inches (305 mm).
 5. **Panel Height:** 1.0 inch (25 mm).

2.3 MISCELLANEOUS MATERIALS

- A. **Miscellaneous Metal Subframing and Furring:** ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. **Panel Accessories:** Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. **Closure Strips:** Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. **Flashing and Trim:** Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

- a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
 - 1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - 3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
 - 4. Stainless-Steel Panels: Use stainless-steel fasteners.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Accessory Installation: 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 panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.53

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Adhered thermoplastic polyolefin (TPO) roofing system.
 - 2. Cover board.
 - 3. Tapered roof insulation.
- B. Related Sections:
 - 1. Section 061000 - Rough Carpentry.
 - 2. Section 076000 - Sheet Metal.

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETING

- A. Pre-installation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

- C. Samples for Verification: For the following products:
 - 1. Sheet roofing.
 - 2. Walkway pads.
- D. Roofer Qualification Data: Submit certification from the manufacturer that this roofer is approved by manufacturer for installation of specified roofing system including insulation.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
- F. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is FM Global approved for roofing system identical to that used for this Project.
 - 1. Single Source Responsibility: Provide primary products, including each type of roofing membranes, bitumen and flashings, by a single manufacturer.
 - 2. Secondary products shall only be as recommended by manufacturer of primary products for use with roofing system specified.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 - 1. Store insulation materials in a dry well ventilated weather-tight place.
 - 2. Provide enclosed trailers, or other means acceptable to Architect, for storing materials on the project site.
 - 3. Do not leave insulation materials on the roof overnight or when roofing work is not in progress.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.8 PRODUCT HANDLING

- A. Store and handle roofing sheets and materials in a manner that will ensure that there is no possibility of significant moisture pick-up.
- B. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of roof deck.
- C. Bring only amount of materials onto the roof to be installed for the particular roofing period. Return excess materials to proper storage to keep these items dry.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTIES

- A. Roofer's Warranty and Maintenance Agreement: The roofer shall furnish the Owner a Maintenance Agreement on the roofing contractor firm's letterhead and signed by an authorized representative of the firm. Follow the wording and format attached to this specifications section, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, walkway products and sheet metal, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.
 - 2. Number of Copies: Submit 2 copies, with original signatures.
- B. Roof System Manufacturer's Special Warranty: The Roofing Manufacturer's Special Warranty shall guarantee at the manufacturer's own cost and expense, to make or cause to be made such repairs to or replacement of, to correct any and all faulty installations or materials of the roofing systems, to keep the roofing systems in a watertight condition throughout the guarantee period. The guarantee shall not be prorated. Deliver executed guarantee to the Architect in 2 original counterparts prior to acceptance of the Work.
 - 1. Single-Source special guarantee includes roofing membrane, flashings, roofing membrane accessories, roof insulation, fasteners, cover board, substrate board, vapor retarder, walkway products, and other single-source components of roofing system marketed by the manufacturer.
 - 2. The definition of the roofing system is the materials and methods used from the deck up. Excluded are metal counter flashing, edging, caps and copings, vent covers (pre-manufactured) and roof drain assemblies unless items are included by prior approval of the Owner in which case included items will be specified as inclusive.
 - 3. Manufacturer's system No Dollar Limit Roofing System Guarantee.
 - 4. Warranty Period: 20 years from date of Substantial Completion.

1.11 INSPECTIONS BY ROOF MANUFACTURER'S REPRESENTATIVE

- A. Owner requires the Roof Manufacturer's authorized technical representative to make visits to the project at the following events at a minimum:
 - 1. Pre-roofing conference.
 - 2. Periodical visits and attendance requested at project meetings during roof application.
 - 3. Inspection of completed roofing work for acceptance.
 - 4. Inspection toward the end of the roofer's Service Guarantee.
 - 5. Inspection toward the end of the Manufacturer's Guarantee.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Roof system specification ST8RA by Johns-Manville, or approved equal.
- B. Approved Manufacturers:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products Company.
 - c. GAF Materials Corporation.
 - d. Stevens Roofing Systems; Division of JPS Elastomerics.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the required uplift pressures for this location; RE: Structural sheets for wind pressures.
- D. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
- E. EPA Energy Star: Roofing membrane shall achieve an initial reflectance of greater than 0.65 and a three year aged reflectance of greater than 0.50.

2.3 TPO ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin (TPO) Sheet: ASTM D 6878, uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced.
 - 1. Thickness: 80 mils (2.03 mm), nominal.
 - 2. Accelerated Weathering: Minimum of 24,000 hours without cracking or crazing as tested using ASTM G155.
 - 3. Tensile Strength: Minimum of 300 lbf as tested using ASTM D751
 - 4. Tearing Strength: Minimum of 85 lbs as tested using ASTM D751
 - 5. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane.
- C. Bonding Adhesive: Manufacturer's standard bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II,
- C. Tapered Insulation: ASTM C 1289, provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.
 1. Provide insulation in thickness to achieve an aged R Value greater than 30.
 2. Minimum thickness of tapered insulation shall be minimum 2-layers and 1-1/2-inches at low point (roof drains).
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 1. Full-spread spray-applied, low-rise, two-component urethane adhesive.

2.7 COVER BOARD

- A. High-Density Polyisocyanurate: High-density polyisocyanurate technology bonded in-line to mineral-surfaced, fiber glass reinforced facers with greater than 125 lbs of compressive strength. Basis of Design: Invinsa Roof Board by J-M; or approved equal.
- B. Other Cover Boards at manufacturer's option as follows:-
 1. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch (13 mm) thick.

2. Cover Board: DOC PS 2, Exposure 1, oriented strand board, 7/16 inch (11 mm) thick.
3. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.
4. Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.

2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements and other conditions affecting performance of the Work:
 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that steel roof deck substrate complies with requirements.
- B. Make corrections to unsatisfactory conditions.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall thickness is 1.5 inches (38 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

- G. Preliminarily Fastened Insulation for Mechanically Fastened Systems: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, which ever is more stringent.
- H. Mechanically Fastened with Subsequent Layers Adhered Insulation: Secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type to deck type.
 - 1. Fasten first layer of insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Install subsequent layers of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.4 COVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so cover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.
- C. Install cover board with long joints of cover board in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with cover board.
 - 1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- D. Trim surface of cover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 - 1. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- E. Adhered Cover Board: Adhere cover board to substrate as follows:
 - 1. Install in a two-part urethane adhesive according to roofing system manufacturer's instruction.

3.5 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions and to meet required uplifts and pressures for region.
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.
 - 1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.6 ADHERED ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply bonding adhesive to splice area of roofing membrane.
- E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings.

3.8 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

- A. Prior to acceptance of roofing work, Contractor shall engage a testing agency to schedule a Non-Destructive Evaluation (NDE) test for moisture detection using a Tremex moisture detection device. The entire roof shall be tested for presence of moisture.
- B. Test Report: Testing agency/tester shall submit written report of results of the test to the contractor, Architect and Owner.
- C. Should installed roof areas be found to contain unacceptable levels of moisture, provide corrective action to unsatisfactory work, such as, removal of unacceptable installation and providing new work in compliance with project requirements.
- D. After providing corrective action, notify re-test the area that has been re-worked.
- E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- F. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 075423

Attachment – Roofer's Warranty and Maintenance Agreement

(EXECUTE ON LETTERHEAD)

Date : _____
(Project Substantial Completion)

Roofer:

Project:
Building _____

ROOFING INSTALLER'S WARRANTY & MAINTENANCE AGREEMENT

We agree to maintain the roofing areas defined by this project for a period of two (2) years from the date of final acceptance. During that period, we will inspect and make temporary repairs to defects and leaks in the roof system within 24 hours of notification from the Owner. As soon as weather permits, we will make permanent repairs to restore the affected areas to the standard of the Contract Documents. It is understood that all this work will be done without cost to the Owner unless it is determined that the leaks and defects were caused by abuse, or by natural phenomena, or unrelated work by others.

Signed -

Print/Typed Name and Title - Roofer's Authorized Representative

This Maintenance Agreement for 2 years and is valid until

Date: _____

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Formed roof drainage system.
 - 2. Formed low-slope roof flashing and trim.
 - 3. Formed steep-slope roof flashing and trim.
 - 4. Formed wall flashing 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METALS

- A. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted 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. High-Performance Organic Finish: Two -coat 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 and Salt Spray Resistance: 2000 hours.
 - 2) Color: As selected by Architect from manufacturer's full range.

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. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
- C. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.

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.

1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- C. Sealed Joints: Form nonexpansion 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 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 SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) 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, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
1. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.
 2. Fabricate from the following material:
 - a. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Manufactured Hanger Style:
 2. Fabricate downspouts from the following material:
 - a. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

2.6 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
- B. Valley Flashing: Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- C. Drip Edges: Fabricate from the following material:

1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following material:
 1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.
- E. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.
 1. Fabricate copings from the following material:
 - a. Prepainted, Metallic-Coated Steel: 0.0396 inch (1.0 mm) thick.

2.7 WALL SHEET METAL FABRICATIONS

- A. Openings Flashing in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high end dams. Fabricate from the following material:
 1. Prepainted, Metallic-Coated Steel: 0.0217 inch (0.55 mm) thick.

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 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 a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) 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 sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 - 1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 - 2. Aluminum: Use aluminum or stainless-steel fasteners.
 - 3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
 - 4. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pretinned surface would show in finished Work.
 - 1. Do not solder prepainted, metallic-coated steel and aluminum 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 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. Install expansion joint caps.
 - 2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 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 at 16-inch (400-mm) centers.
- 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.
 2. Interlock interior bottom edge of coping with continuous cleats anchored to substrate at 16-inch (400-mm) centers.
- 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 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. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

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 4 inches (100 mm) beyond wall openings.

END OF SECTION 076200

SECTION 077200 – ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Provide factory-fabricated roof hatches for ladder access.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 manufacturer

- A. Basis-of-Design Manufacturer: Type S Roof Hatch by The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.
- B. Approved Manufacturers:

1. Babcock-Davis; a Cierra Products Inc Company
2. Custom Curb, Inc.
3. Hi Pro International, Inc.
4. J. L. Industries, Inc.
5. Milcor Inc.; a Gibraltar Company.
6. Nystrom, Inc.
7. Roof Products & Systems Corporation.
8. Wasco Products, Inc.
9. Western Canwell.

2.2 ROOF HATCH

- A. Furnish and install where indicated on plans metal roof hatch Type S, size width: 36" (914mm) x length: 30" (762mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span and a 140 psf (684 kg/m²) wind uplift for galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches. (Must meet site wind and pressure requirements)
 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 3. Operation of the cover shall not be affected by temperature.
 4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
 5. Galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches shall be Miami-Dade Product approved (NOA No. 14-0708.07 Expiration Date: December 2, 2019), meeting large and small missile impact requirements. Florida Product Approval #FL15110.
- C. Cover: Shall be 14 gauge (1.9mm) paint bond G-90 galvanized steel with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- D. Cover insulation: Shall be fiberglass of 1" (25mm) thickness, fully covered and protected by a metal liner select: 22 gauge (.8mm) paint bond G-90 galvanized steel.
- E. Curb: Shall be 12" (305mm) in height and of 14 gauge (1.9mm) paint bond G-90 galvanized steel. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25mm) thickness on outside of curb.

- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe through bolted to the curb assembly.
- H. Hardware
 - 1. Heavy pintle hinges shall be provided
 - 2. Cover shall be equipped with a spring latch with interior and exterior turn handles
 - 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 - 4. The latch strike shall be a stamped component bolted to the curb assembly.
 - 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
 - 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be Type 316 stainless steel hardware.
 - 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be alkyd based red oxide primed steel

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
 - 1. Test units for proper function and adjust until proper operation is achieved.
 - 2. Repair finishes damaged during installation.
 - 3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

SECTION 07 84 00 - FIRESTOPPING & SMOKESTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes firestop systems and smokestops for penetrations and openings through the following:
 - 1. Fire-resistance-rated walls and partitions.
 - 2. Smoke barriers.

1.2 PERFORMANCE REQUIREMENTS

- A. Firestops: Provide through-penetration firestop systems that resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
 - 1. Ratings: Firestopping materials and components shall be UL rated and listed in UL's Building Materials Directory. Rating for conditions as follows:
 - a. Wall and Partition penetrations: 1-hour and 2-hour rated walls.
 - b. Include sealing of walls abutting underside of roof decks.
- B. Smokestops: Provide at wall openings and penetrations at corridor walls and other walls indicated.
 - 1. Include sealing of walls abutting underside of roof decks.

1.3 SUBMITTALS

- A. Product Data: For each type of through-penetration firestop system product.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
- C. Fire-Test-Response Characteristics: Firestop systems that comply with the following requirements and those specified in "Performance Requirements".
 - 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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop s products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date

of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.

- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation for proper curing .

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop and smokestop materials.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 FIRESTOPPING MATERIALS

- A. Fire-Resistant Sealant Materials: Elastomeric type, silicone or urethane content, selected by Installer to meet project requirements.
 - 1. Fire-rated, UL listed, ASTM E814 and UL 1479.
 - 2. Subject to compliance with project requirements, provide products by Dow Corning, 3M Fire Protection Products, General Electric Co., Pecora, The RectorSeal Corporation, Tremco, or approved equal.
- B. Accessories: Packing material, sleeves, fillers, bond breakers, primers and other accessories as recommended by fire-rated sealant manufacturer.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems 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 that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 SMOKESTOP MATERIALS

- A. Subject to type of penetration or opening, provide smokestops of one or more of the following materials, subject to approval by authorities having jurisdiction.
1. Slag-/rock-wool-fiber insulation.
 2. Sealants used in combination with other forming/damming/backing materials to seal opening or penetration.
 3. Other smokestop materials approved by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION, PREPARATION AND INSTALLATION

- A. Examine, prepare, clean and prime joints in accordance with manufacturer's instructions.
- B. Install packing materials or fillers in accordance with manufacturer's recommendations. Prepare and treat surfaces of packing material or filler to receive firestopping sealant as recommended by manufacturer.
- C. Apply firestop sealants and accessories to penetrations at rated walls in accordance with manufacturer's recommendations to meet ratings indicated and required.
- D. Cure and protect installed sealant in accordance with manufacturer's directions.
- E. Apply smokestop materials to seal openings in smoke barriers.

3.2 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone

seeking to remove penetrating items or firestop systems. 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.

3.3 CLEANING AND PROTECTION

- A. Clean and remove excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07 84 00

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
 - 1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 2. Exterior joints in horizontal traffic surfaces.
 - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 4. Interior joints in horizontal traffic surfaces.
- B. See Division 2 Section "Pavement Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Compatibility and adhesion test reports.
- D. Product test reports.

1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

- C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

- 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

- 1. Warranty Period: Two years from date of Substantial Completion.

- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

- 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Pourable Neutral-Curing Silicone Sealant ES-1:

1. Products:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 300 Pavement Sealant (Self Leveling).
 - c. Dow Corning Corporation; SL Parking Structure Sealant.
2. Type and Grade: S (single component) and P (pourable).
3. Class: 100/50.
4. Uses Related to Exposure: NT and T (traffic).
5. Uses Related to Joint Substrates: O, as applicable to joint substrates indicated.

D. Single-Component Neutral-Curing Silicone Sealant ES-2:

1. Products:
 - a. Dow Corning Corporation; 790.
 - b. GE Silicones; SilPruf LM SCS2700.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

2.4 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints AS-1: Manufacturer's standard 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.

1. Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.5 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) O (open-cell material) B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size

and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
 - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 2. Remove laitance and form-release agents from concrete.
 - a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended 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.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application JS-1: Exterior horizontal nontraffic and traffic isolation and contraction joints in cast-in-place concrete slabs.

1. Joint Sealant: Single-component pourable neutral-curing silicone sealant ES-1.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- B. Joint-Sealant Application JS-2: Exterior vertical control and expansion joints in stucco.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- C. Joint-Sealant Application JS-3: Exterior butt joints between metal panels.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range..
- D. Joint-Sealant Application JS-4: Exterior vertical joints between different materials listed above.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- E. Joint-Sealant Application JS-5: Exterior perimeter joints between stucco and frames of doors windows and louvers.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- F. Joint-Sealant Application JS-6: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- G. Joint-Sealant Application JS-7: Interior perimeter joints of exterior openings.
1. Joint Sealant: Single-component neutral-curing silicone sealant ES-2.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- H. Joint-Sealant Application JS-8: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
1. Joint Sealant: Single-component mildew-resistant neutral -curing silicone sealant ES-2.
 2. Joint-Sealant Color: White.
- I. Joint-Sealant Application JS-9 Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
1. Joint Sealant: Latex sealant AS-1.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal doors and frames.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.3 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure NFPA 252.
- B. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld Building Products, LLC.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Deansteel Manufacturing Company, Inc.
 - 5. Firedoor Corporation.
 - 6. Fleming Door Products Ltd.; an Assa Abloy Group company.
 - 7. Habersham Metal Products Company.
 - 8. Kewanee Corporation (The).
 - 9. Mesker Door Inc.
 - 10. Pioneer Industries, Inc.
 - 11. Security Metal Products Corp.
 - 12. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I.
- G. Glazing: Division 08 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
 - 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
 - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), [Model 1 (Full Flush)].
- C. Hardware Reinforcement: ANSI/SDI A250.6.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as knocked down or face welded unless otherwise indicated.

3. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
4. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
5. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
6. Frames for Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as knocked down or face welded unless otherwise indicated.
3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
4. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
5. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
6. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
7. Frames for Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
8. Frames for Wood Doors: 0.053-inch- (1.3-mm-) thick steel sheet.

D. Hardware Reinforcement: ANSI/SDI A250.6.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, same material as door face sheet.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, same material as frames.

D. Terminated Stops: Where indicated, terminate stops 6 inches (152 mm) above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- (6.4-mm-thick by 25.4-mm-) wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.8 FABRICATION

- A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- B. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
 - 2. Glazed Lites: Factory cut openings in doors.
 - 3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
- C. Hollow Metal Frames: Where frames are fabricated in sections, 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 make smooth, flush, and invisible.
 - 2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
 - 5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
 - 7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
 - a. Single-Door Frames: Three door silencers.
 - b. Double-Door Frames: Two door silencers.
- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow metal work.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: ANSI/SDI A250.10.
 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.
2. Division 13 Section "Radiation Protection" for lead-lined flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. 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 requirements for veneer matching.
4. Indicate doors to be factory finished and finish requirements.
5. Indicate fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Marshfield Doors; Red Oak Bombay 6402
- B. Equal Manufacturers:
 - 1. Algoma Hardwoods, Inc.
 - 2. Buell Door Company Inc.
 - 3. Chappell Door Co.
 - 4. Eagle Plywood & Door Manufacturing, Inc.
 - 5. Eggers Industries.
 - 6. Graham; an Assa Abloy Group company.
 - 7. Mohawk Flush Doors, Inc.; a Masonite company.
 - 8. Oshkosh Architectural Door Company.

2.2 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
 - 2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, exits, and where indicated.
- B. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2.
 - 2. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- C. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).
 - b. Screw Withdrawal, Edge: 400 lbf (1780 N).
- 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.
 - 3.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Red oak.
3. Cut: Quarter sliced.
4. Match between Veneer Leaves: Pleasing match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Core: Either glued wood stave or structural composite lumber.
8. Construction: Seven plies, either bonded or nonbonded construction.

2.4 LOUVERS AND LIGHT FRAMES

- A. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

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. Openings: Cut and trim openings through doors in factory.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
 3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY 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 faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

- B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI conversion varnish system.
 - 3. Staining: As selected by Architect from manufacturer's full range. (See drawing)
 - 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 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 (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) 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 (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes access doors and frames for **walls and ceilings**.

1.2 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 QUALITY ASSURANCE

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for vertical access doors and frames.
 - 1. ASTM E 119 or UL 263 for horizontal access doors and frames.

1.4 COORDINATION

- A. If retaining this Article, also retain "Schedule" Paragraph in "Submittals" Article.
- B. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.
- C. Submit shop drawing at beginning of project showing all locations and sizes of access panels for architect review and approval.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

- B. Steel Sheet: electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 (ZF180) zinc-iron-alloy (galvannealed) coating or G60 (Z180) mill-phosphatized zinc coating.
- D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Factory-Primed Finish: Manufacturer's standard shop primer.
 - 2. Baked-Enamel Finish: Minimum dry film thickness of 2 mils (0.05 mm).
 - 3. Powder-Coat Finish: Thickness not less than 1.5 mils (0.04 mm).
- E. Drywall Beads: 0.0299-inch (0.76-mm) zinc-coated steel sheet to receive joint compound.
- F. Plaster Beads: 0.0299-inch (0.76-mm) zinc-coated steel sheet with flange of expanded metal lath.
- G. Manufacturer's standard finish.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acudor Products, Inc.
 - 2. Babcock-Davis; A Cierra Products Co.
 - 3. Bar-Co, Inc. Div.; Alfab, Inc.
 - 4. Cendrex Inc.
 - 5. Dur-Red Products.
 - 6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
 - 7. Jensen Industries.
 - 8. J. L. Industries, Inc.
 - 9. Karp Associates, Inc.
 - 10. Larsen's Manufacturing Company.
 - 11. MIFAB, Inc.
 - 12. Milcor Inc.
 - 13. Nystrom, Inc.
 - 14. Williams Bros. Corporation of America (The).
- B. Recessed Access Doors and Trimless Frames: Fabricated from steel sheet.
 - 1. Locations: Wall and ceiling surfaces.
 - 2. Door: Minimum 0.060-inch- (1.5-mm-) thick sheet metal in the form of a pan recessed 5/8 inch (16 mm) for gypsum board infill.
 - 3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with drywall bead.
 - 4. Hinges: Spring-loaded, concealed-pin type.
 - 5. Latch: Cam latch with interior release.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view, provide materials with smooth, flat surfaces without blemishes.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder lock, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 08 36 13 - SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed Aluminum Sectional Overhead Doors
- B. Electric Operators and Controls.
- C. Operating Hardware, tracks, and support.

1.2 REFERENCES

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.
- B. ASTM A 123 – Zinc hot-dipped galvanized coatings on iron and steel products.
- C. ASTM A 216 - Specifications for sectional overhead type doors.
- D. ASTM A 229 - Steel wire, oil-tempered for mechanical springs.
- E. ASTM A 653 - Steel sheet, zinc-coated galvanized by the hot-dipped process, commercial quality.
- F. ASTM D 1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.
- G. ASTM E 84 - Tunnel test for flame spread and smoke developed index.
- H. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.
- I. ASTM E 413 - Classification for Rating Sound Insulation
- J. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.
- K. 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

1.3 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - 1. Design pressure of 33 lb/sq ft (1.58kPa). Verify with Structural Chart on S.01 and with AHJ.
- B. Wiring Connections: Requirements for electrical characteristics.
 - 1. 230 volts, three phase, 60 Hz.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.

- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

1.7 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of Design: Wayne Dalton; 2501 S. State Highway 121 Business, Suite 200, Lewisville, TX 75067. ASD. Phone: (800) 827-3667
- B. Additional Approved Manufacturers, provided they meet the Basis-of-Design Specification:
 - 1. Overhead Door; 2501
 - 2. Arm-R-Lite
 - 3. Clopay Building Products;
 - 4. Raynor
 - 5. General American Door Company

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

- A. Glazed Sectional Overhead Doors: Wayne Dalton 451 Series Aluminum Doors. Units shall have the following characteristics:
 - 1. Door Assembly: Stile and rail assembly of aluminum alloy 6063-T6, 1-3/8 inch thick stiles and rails, joined with self tapping screws.
 - a. Rails: Top and bottom rails with 3-1/2 inches wide, lower intermediate rail 1-3/8 inches, upper rail 1-5/8 inches, minimum wall thickness 0.062 inch.
 - b. Springs:
 - 1) Standard cycle spring: 10,000 cycles minimum.
 - c. Glazing:
 - 1) 1/4 inch (6 mm) Acrylic (Plexiglass) glazing.
 - 2. Finish and Color:
 - a. Anodized Finish: Clear anodized (at openings)
 - b. Powder Coating Finish: White
 - 3. Windload Design: Provide to meet the Design/Performance requirements specified.
 - 4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

5. Lock:
 - a. Interior mounted slide lock.
6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
 - a. Size:
 - 1) 2 inch (51 mm).
 - b. Type:
 - 1) Standard lift.
 - 2) Follow roof slope. (Of back pitch)
 - c. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.
8. Electric Motor Operation: Provide UL listed electric operator, equal to Genie Commercial Operators, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - a. Medium Duty
 - 1) Model MT – trolley (w/solenoid brake)
 - b. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - 1) Photoelectric sensors monitored to meet UL 325/2010. (Impact protected commercial kit)
 - c. Operator Controls:
 - 1) Push-button operated control stations with open, close, and stop buttons. (multiple (2) stations per door – refer to plans for final locations)
 - 2) Surface mounting.
 - 3) Exterior location. (Refer to drawings for final locations)
 - d. Emergency Manual Operation
 - 1) Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf

2.3 STEEL SECTIONAL OVERHEAD DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Basis of Design Selection: Model 3200H5-1(verify with electrical)-L5 by Clopay Building Products; a Griffon company.
 2. Products by other manufacturer's listed below are acceptable.
 - (a) Cornell
 - (b) General American Door Company.
 - (c) Raynor.
 - (d) Wayne-Dalton Corp.
- B. Steel Sectional Door: Sectional door formed with hinged sections.
- C. Operation Cycles: Not less than 20,000.

- D. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 (Z275) zinc coating
 - 1. Section Thickness: 2 inches (51 mm).
 - 2. Exterior-Face, Steel Sheet Thickness: Minimum 24 gage, 0.028-inch- (0.71-mm) nominal coated thickness.
 - (a) Surface: minor and deep ribs.
 - 3. Interior Facing Material: Zinc-coated (galvanized) steel sheet.
 - 4. Track Configuration: Standard-lift track.
 - 5. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.
 - 6. Electric Door Operator:
 - a. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 - b. Operator Type: Manufacturer's standard for door requirements.
 - c. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet (2.4 m) or lower.
 - d. Motor Exposure: Interior.
 - e. Emergency Manual Operation: Chain type.
 - f. Obstruction-Detection Device: Automatic photoelectric sensor.
 - g. Control Station: Interior-side mounted.
 - 7. Door Finish:
 - a. Powder-Coated Finish: Gray.
 - 1) Submit verification sample.
 - b. Finish of Interior Facing Material: Match finish of exterior section face.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- G. Instruct Owner's personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean doors, frames and glass using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.

END OF SECTION 08 36 13

SECTION 08 41 13 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS (IR)

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Exterior Impact Resistant Aluminum Storefront Systems and doors.
 - 2. Interior non-impact aluminum-framing for fixed glass panels and doors.

1.02 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
 - 2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
 - 3. Provide concealed fastening.
 - 4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
 - 5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between individual units.
 - 6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
 - 7. Where anchor inspections are required, sill design with appropriate access will be provided.
 - 8. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
- B. Performance Requirements:
 - 1. Air infiltration: Maximum allowable infiltration of 0.06 cfm/ft² (1.1 m³/h*m²) when tested in accordance with ASTM E 283 at differential static pressure of 6.24 psf (300 Pa).
 - 2. Water infiltration:
 - a. Static: No uncontrolled leakage when tested in accordance with Miami-Dade County and Florida Building Code HVHZ (TAS-202) and ASTM E331 at test pressure of 15 psf (720 Pa).
 - b. Dynamic: No uncontrolled leakage when tested in accordance with ASTM E 547 at test pressure of 15 psf (720 Pa).
 - 3. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," whichever are more stringent.
 - a. Wind Loads for exterior assemblies:

- 1) Positive Pressure: 75 psf (maximum)
- 2) Negative Pressure: 75 psf (maximum)
- 3) Verify with Structural requirements on structural drawings
4. Deflection: Maximum allowable deflection of any framing member in direction normal-to-plane of wall when subjected to specified design pressures in accordance with ASTM E 330 shall be limited to
 - a. $L/175$ of any clear span up to 13'-6"
 - b. $L/240 + 1/4"$ of any clear span over 13'-6"
5. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range. The system shall be capable of withstanding a metal surface temperature range of 180 degrees F (100 degrees C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.
6. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimensions when carrying full dead load.
 - a. Provide a minimum 1/8 inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below.
 - b. Provide a minimum 1/16 inch (1.59-mm) clearance between members and operable windows and doors.
7. Windborne Debris Impact Resistance:
 - a. Large and Small Missile Impact per Miami – Dade County Building Code protocol (TAS-201), Florida Building Code HVHZ (TAS-201) and ASTM E 1996
 - b. Cyclic Load Test per Miami – Dade County Building Code protocol/Florida Building Code HVHZ (TAS-203) and ASTM E 1886 test requirements.
 - c. Uniform Static Load Test per Dade – County Building Code protocol/Florida Building Code HVHZ (TAS-202) and ASTM E 330.

1.03 SUBMITTALS

- A. General: Submit in accordance with Section 01 30 00.
- B. Product Data:
 1. Submit manufacturer's descriptive literature and product specifications.
 2. Include information for factory finishes, hardware, accessories, and other required components.
 3. Include color charts for finish indicating manufacturer's standard colors available for selection.
- C. Shop Drawings:
 1. Submit shop drawings covering fabrication, installation and finish of specified systems.

2. Include the following:
 - a. Fully dimensioned plans and elevations with detail coordination keys.
 - b. Locations of exposed fasteners and joints.
 3. Provide detailed drawings of:
 - a. Composite members.
 - b. Joint connections for framing systems and for entrance doors.
 - c. Anchorage.
 - d. System reinforcements.
 - e. System expansion and contraction provisions.
 - f. Glazing methods and accessories.
 - g. Internal sealant requirements.
 4. Schedule of finishes.
- D. Samples:
1. Submit manufacturers standard samples indicating quality of finish.
 2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
 3. Submit samples for each type of glass, 12 x 12 inch size.
- E. Product Test Reports:
1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.
- F. Qualification Data:
1. Submit installer qualifications verifying years of experience.
- G. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Installer should have successful experience in installation of products covered in this Section on similar projects in scope and size.
- B. Manufacturer Qualifications: Manufacturer should be experienced with products covered under this Section and capable of providing a storefront system capable of meeting or exceeding the performance criteria noted in this Section.
- C. Pre-Installation Conference: Conduct a pre-installation conference at the project site to comply with the requirements in Section 01 31 00, "Project Management and Coordination."
- D. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.
- E. Conform to requirements of ANSI A117.1 and local amendments.
- F. Single Source Responsibility

1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces as necessary to prevent damage.
- B. Do not use adhesive papers or sprayed coatings, which become firmly bonded when exposed to sun.
- C. Do not leave coating residue on any surfaces.
- D. Replace damaged units.

1.06 WARRANTY

- A. Provide written warranty in form acceptable to owner jointly signed by manufacturer, installer and contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
- B. Warranty shall cover following:
 1. Complete watertight and airtight system installation within specified tolerances.
 2. System is structurally sound and free from distortion.
- C. Provide written warranty stating organic coating finish will be free from fading more than 10%, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 1 year from date of Substantial Completion and agreeing to promptly correct defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS (Exterior Impact Resistant Aluminum Storefront Systems)

- A. Oldcastle Series 5100T Flush Glaze StormMax (Impact Resistant)
- B. Kawneer Trifab VG, 451T-IR (Impact Resistant)
- C. Vistawall Series Fg-3000 (Impact Resistant)
- D. YKK (Impact Resistant)
- E. Impact Resistant Aluminum Storefront Framing Systems:
 1. Description: Flush Glazed System, center set, exterior glazed, screw spline
 2. Pre-glazed or field glazed
 3. Frame Dimensions: Manufacturer Standards
 4. Components: Manufacturers standard extruded aluminum mullions, doors and framing, associated components and steel reinforcement as necessary. Structural members to be extruded from 6063-T6 aluminum alloy.
 5. Glazing: System should accommodate up to 1 5/16" laminated glass.
- F. Interior storefront systems Basis of Design: Kawneer Trifab VG 450.

1. Approved manufacturers:
 - a. Oldcastle
 - b. YKK
 - c. Vistawall

2.02 FRAMING MATERIALS AND ACCESSORIES

- A. Aluminum:
 1. Complying with ASTM B 221, 6063-T6 aluminum to be used for extrusions; and per ASTM B 209, use 5005-H16 alloy for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
 2. Minimum thickness of [0.080] inch for main framing members.
- B. Internal Reinforcing:
 1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
 2. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645A.
- C. Anchorage Devices:
 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
 2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A 123, 2.0 ounce minimum coating.
- D. Fasteners:
 1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
 2. Provide concealed fasteners wherever possible.
 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
 4. For concealed locations, provide manufacturer's standard fasteners.
- E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
- F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645A.
- G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641(G)1.
- H. Glazing Gaskets:
 1. Compression-type design, replaceable and extruded, EPDM gasket that meets the requirement of ASTM C 864. Profile and hardness as required to maintain uniform pressure for watertight seal.
 2. Dow – Corning #795 structural silicone sealant at interior gasket with FG-5185 spacer gasket.
- I. Weatherstripping:
 1. Provide D-1913 EPDM fin seal in AS-6 adjustable astragal.
 2. Provide D-174 silicone weatherstripping in bottom door rail.
- J. Internal Sealants and Sealant Tapes.

2.03 GLASS AND GLAZING ACCESSORIES

- A. Refer to Section 08 80 00.

2.04 FABRICATION

- A. Coordination of Fabrication:
 - 1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
 - 2. Fabricate units to withstand loads, which will be applied when system is in place.
- B. General
 - 1. Conceal fasteners wherever possible.
 - 2. Reinforce work as necessary for performance requirements, and for support to structure.
 - 3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
 - 4. Comply with Section 08 81 00 for glazing requirements.
- C. Aluminum Framing:
 - 1. Provide members of size, shape and profile indicated.
 - 2. Fabricate frame assemblies with joints straight and tight fitting.
 - 3. Reinforce internally with structural members as necessary to support design loads.
 - 4. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
 - 5. Seal horizontals and direct moisture accumulation to exterior.
 - 6. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
 - 7. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detriment to appearance or performance.
 - 8. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and FGMA Glazing Manual.
- D. Welding:
 - 1. Comply with recommendations of the American Welding Society.
 - 2. Use recommended electrodes and methods to avoid distortion and discoloration.
 - 3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- E. Flashings: Form from sheet aluminum with same finish as extruded sections. Material thickness as required to suit condition without deflection or "oil canning".
- F. Doors: Reinforce doors as required for installing hardware
 - 1. At exterior doors, provide weather sweeps applied to door bottoms
 - 2. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge
- G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes

2.05 FINISHES

- A. Clear Anodized:
 - 1. Conforming to AA-M12C22A31 and AAMA 607.1.
 - 2. Architectural Class I, etched, medium matte, clear anodic coating, 0.4 mil minimum thickness.

2.06 DOORS

- A. Doors: Manufacturer's standard glazed doors, for manual swing operation:
 - 1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: Medium stile, unless indicated otherwise.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 12 inches above floor or ground plane
 - 3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with Section 01 40 00.

3.02 INSTALLATION

- A. Erection Tolerances:
 - 1. Limit variations from plumb and level:
 - a. 1/8 inch in 10'-0" vertically.
 - b. 1/8 inch in 20'-0" horizontally.
 - 2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
 - 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
- F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.
- G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07 92 00.

- H. Glazing: Entrances: Install to produce smooth operation and tight fit at contact points.
 - 1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure
 - 2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible
- I. Glazing: Refer to requirements of Section 08 80 00.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION 08 41 13

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes commercial door hardware for swinging doors.
- B. Related Sections:
 - 1. Hardware for cabinets and casework is specified in Division 6.
 - 2. Division 8 section; Hollow Metal Doors and Frames.
 - 3. Division 8 section; Flush Wood Doors.
 - 4. Division 8 section; Aluminum Storefront Doors and Framing.
- C. Contractor to coordinate requirements with Owner provided access control and subcontractor prior to assembling shop drawings. Pre-shop drawings meeting will occur with both parties and architect.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturers' catalog cut sheets and technical information for each item of hardware. Include information showing compliance with requirements.
- B. Hardware Schedule: Organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include each item, quantities, manufacturers' catalog numbers, sizes and hardware identifications corresponding to ANSI type or function number to manufacturer's catalog number. Hardware schedule sets and door numbers of submittal shall correspond with respective door numbers assigned for this project. Include with submittal a list of abbreviations and template numbers used.
 - 1. Keying: Include keying schedule after keying conference described below.
- C. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

- A. Hardware Supplier and Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
 - 1. A recognized architectural hardware supplier who has been furnishing hardware in the project's vicinity for a period of not less than 5 years, and who is, or employs an experienced hardware consultant (AHC) who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.
 - 2. Scheduling Responsibility: Prepare door hardware and keying schedules.
 - 3. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

- B. ADA and Code Compliance: Provide hardware items in compliance with ADA and pertinent applicable codes.
- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. Keying Conference: Conduct conference at Project site. In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Address for delivery of keys.
- E. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
- B. Deliver keys to manufacturer of key control system for subsequent delivery to Owner. Deliver keys to Owner by registered mail or overnight package service.

1.5 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6 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 specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, except as follows:
 - a. Electromagnetic Locks: 5 years from date of Substantial Completion.

- b. Exit Devices: 2 years from date of Substantial Completion.
- c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Hardware Sets are indicated in "Hardware Schedule" at the end of this Section.
- B. Material requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated below.

2.2 GENERAL ACCESSIBILITY REQUIREMENT

- A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
 - 1. Comply with the following maximum opening-force requirements: Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

2.3 HINGES

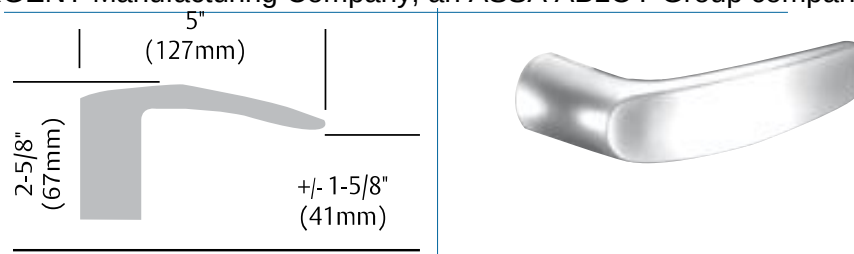
- A. Hinges: ANSI A156.1.
 - 1. Exterior Doors: Stainless steel, with non-removable stainless steel pins.
 - 2. Interior Doors: Steel, with non-rising steel pins.
 - 3. Tips: Flat button and matching plug, finished to match leaves.
 - 4. Doors with Closers: Ball bearing type.
 - 5. Full mortise, heavy duty, 5-knuckle type.
- B. Size and Gage:
 - 1. 0.134 gage metal minimum.
 - 2. 4-1/2" x 4-1/2" (114 x 114 mm).
- C. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- D. Fasteners - Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors, wood screws for wood doors. Finish screw heads to match surface of hinges.
- E. Manufacturers: Subject to compliance with project requirements, provide products manufactured by the following, or approved equal:
 - 1. T2714 or TB 2314 (Stainless steel) by McKinney.
 - 2. FBB 179 or FBB191 (Stainless steel) by Stanley.
 - 3. BB 1279 or BB1191 (Stainless steel) by Hager.
 - 4. BB 21 or BB51 (Stainless steel) by PBB

2.4 CONTINUOUS HINGES

- A. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
1. Heavy duty.
 2. Clear anodized aluminum finish.
 3. Products & Manufacturers:
 - a. Basis of Design: 780-224HD by Hager.
 - b. Other Approved Manufacturers: Subject to compliance with project requirements, provide products by the following -
 - 1) Bommer Industries, Inc.).
 - 2) McKinney Products Company.
 - 3) Pemko Manufacturing Co.
 - 4) Select Products Limited.
 - 5) Zero International.

2.5 LOCKSETS

- A. Locksets: Bored Locks, BHMA A156.2, Grade 1; Series 4000.
1. Stamped steel case with steel or brass parts. Plastic and non-metallic parts or components not permitted.
 2. Strikes: Manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.
 3. Lock Trim: ANSI A156.2. Finish to match lockset.
- B. Lockset Manufacturer: Basis-of-Design: B lever design with L rose, 10-Line Lever Locks by SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT)



1. Levers: Solid cast metal. Fabricate lever handles from solid bar stock; unreinforced hollow lever handles are not acceptable.
2. Approved Manufacturers: Yale Commercial Locks and hardware; Corbin Russwin Architectural Hardware, or approved equal.

2.6 AUXILIARY LOCKS AND LATCHES

- A. Auxiliary Locks: BHMA A156.5 , Grade 1.
1. Manufacturer: Basis-of-Design: 4870 series. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
 2. Approved Manufacturers: Yale Commercial Locks and hardware; Corbin Russwin Architectural Hardware, or approved equal.

2.7 RIM PANIC DEVICES

- A. Rim Panic Exit Devices: BHMA A156.3, Grade 1. Surface mount. Type 1, Figure 3 narrow stile push pad.
 - 1. Outside Trim: Lever design to match lockset lever described above.
 - 2. Rectangular escutcheon plate.
 - 3. Exterior egress doors with cylinder dogging and keyed removable mullions.
 - 4. Comply with key cores and keying as described in this section. Units capable of receiving Owner's proprietary interchangeable key cores.
- B. Products - Basis of Design: 3828 series rim panic device with 28 series lever (B lever with L rose) Function 08 by Sargent, or approved equal.

2.8 DEADLATCH

- A. Deadlatch Assembly (for aluminum storefront egress doors): Complete with latchbolt, cylinder cam, case, and trim plates. Push paddle inside, keyed outside.
 - 1. Comply with keying and keycore requirements specified herein.
- B. Products - Basis of Design: 4510 Deadlatch by Adams-Rite ASSA ABLOY, or approved equal.

2.9 KEYING AND KEYCORES

- A. Keying: Schedule a keying conference as described above to discuss keying. Allow a minimum of 1 week advance notice for this conference. Based on Owner's guidelines, submit a keying system to the Architect for approval. Unless otherwise indicated or requested, the following apply:
 - 1. Key all doors differently.
 - 2. Key doors to the same room alike.
 - 3. Key exterior doors in same building alike.
 - 4. Master key for each area or portion of building designated by Owner.
 - 5. Grand Master key for this building; under Owner's grandmaster system.
- B. Keys: Nickel silver. Permanently inscribed with a visual key control number and including the notation "DO NOT DUPLICATE."
 - 1. Tag and identify keys.
 - 2. Turn over to the Owner as directed.
 - 3. Number of Keys:
 - a. Construction master keys: 10
 - b. Cylinder Change Keys: 3, and one extra blank key for each lock.
 - c. Master Keys: 5.
 - d. Grand Master Keys: 6.
- C. Key Cores: Provide 6-pin cores.
 - 1. Interchangeable Cores: Provide interchangeable key core inserts, removable by use of a special key; usable with other manufacturers' cylinders.
 - 2. Temporary Construction Key Cores: Provide temporary construction key cores for construction purposes to secure doors with access into facility.
 - 3. Permanent Key Cores:
 - a. Factory key by authorized direct distributor of keying manufacturer.

- b. Order final cores at the time submittals are made.
- c. Install final permanent cores immediately after Owner's acceptance. At completion of the project, the contractor must activate the cylinders to operate by the owners permanent keys.
- d. Provide keyed bitting list upon completion.
- e. Permanent keys and a copy of the final keying schedule must be delivered direct to the owner by the finish hardware supplier.

2.10 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 400 percent of the number of locks.
 - 1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

2.11 PUSH-PULLS

- A. ANSI A156.6. Manufacturer's standard exposed fasteners for installation. Through-bolted for matched pairs, but not for single units.
 - 1. Plates: 0.050-inch thick with 4" x 16" stainless steel plates.
 - 2. Products: 8200 pull and 8302-6 pull plate units by Ives; 1001-9 and 1001-9 with 3B pull by Trimco; or approved equal.

2.12 DOOR PULLS (FOR STOREFRONT AND GLASS DOORS) AND PUSH (FOR STOREFRONT DOOR)

- A. Fabricated from 1" x 1-1/2" oval tube bars, brushed chrome finish, surface mounted cast metal pulls. Basis-of-Design: Architectural Pulls, Ovaltek RM2300 by Rockwood or equal.
- B. Push - Horizontal Bar: Fabricate from same material as pull bar. Length horizontally across storefront door at push height.

2.13 CLOSERS

- A. Grade 1, PT1, C02000 series, surface mounted modern type conforming to ANSI A156.4.
 - 1. Regular arms for overhead closers, except as otherwise indicated.
 - 2. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
 - 3. Coordinate closer arms and closer locations with door swing and walls to avoid damage to adjacent construction.
 - 4. Locate closers at interior side of doors unless indicated otherwise.
 - 5. Exterior egress doors typically shall have heavy duty parallel stop arms. Standard arms not permitted.
- B. Accessibility Requirements: Comply with the following maximum opening-force requirements:

1. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 2. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- C. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
- D. Hold-Open Closers/Detectors: Coordinate and interface integral smoke detector and closer device with fire alarm system.
- E. Products: Series 4000 by LCN, 7800 series by Dorma, 7700 series by Norton, EN351 series by Sargent, 400 series by Yale, or approved equal.

2.14 KICKPLATES

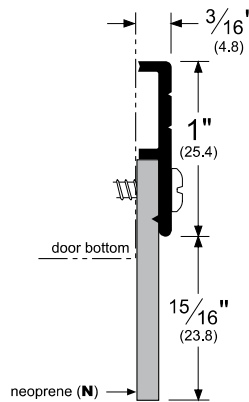
- A. ANSI A156.6. Stainless steel, 18 gage (1.27 mm) thick material unless indicated otherwise, protection plates. Kickplates of not more than 1-1/2 inches (38 mm) on stop side smaller than the door width x the height indicated.
1. Kickplates: J102, 10 inches high.

2.15 STOPS AND HOLDERS

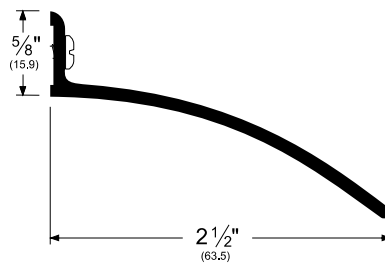
- A. Door Stops: ANSI A156.16. Metal base with rubber stops. Provide floor stops unless indicated otherwise in the Hardware Schedule.
1. Floor mounted, dome type with rubber bumper, L02141 for doors without thresholds, L02181 for doors with thresholds.
 - a. Doors with Thresholds: 438 by Ives; W1212 by Trimco; or approved equal.
 - b. Doors without Thresholds: 436 by Ives; W1210 by Trimco; or approved equal.
 2. Wall mounted type, L02111, round metal retainer with convex resilient bumper. No fasteners visible on installed assembly. Manufacturer's recommended fasteners for substrates provided.
 - a. 407 by Ives; 1276CCS by Trimco; or approved equal.

2.16 MISCELLANEOUS DEVICES

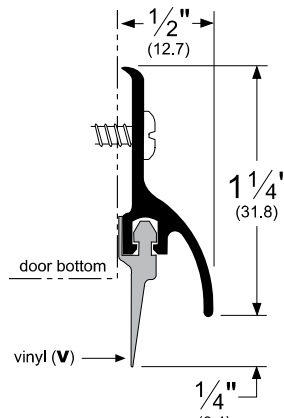
- A. Top and Bottom Bolts: Automatic Flush Bolts. Manufacturer's strikes.
1. Model FB41P by Ives, or equivalent products by Glynn-Johnson, Rockwood, Sargent, Schlage, Yale or approved equal.
- B. Lock Protectors: 18 gage stainless steel. LP3 by Glynn Johnson, or approved equal.
- C. Mutes/Silencers: ANSI A156.16. L03011. Rubber type, 3 for single door openings and 4 for double door openings. Color - grey.
1. Products: GJ64 by Glynn Johnson, 1229A by Trimco, 608 by Rockwood, or approved equal.
- D. Door Bottom Sweep: Adjustable type. Continuous aluminum retainer with vinyl or neoprene sweep. UL label. 321CN by Pemko, Model 602A by Reese, 199NA by National, or approved equal.



- E. Rain Guard: Overhead aluminum rain drip diverter. Surface mount to head frame of door. Pemko 346-C; or approved equal.



- F. Sweep with Rain Guard-Drip: Continuous aluminum retainer drip, with replaceable vinyl sweep. Surface mount to bottom of door. 3452-C Pemko; or approved equal.



2.17 WEATHERSTRIPPING AND SEALS

- A. Standard: BHMA A156.22.
- B. General: Continuous bulb seal made of vinyl, neoprene, polypropylene or silicone with aluminum retainer fastened to door frame at head and jamb sides. UL rated. Non-corrosive fasteners for exterior applications and elsewhere as indicated.
1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

2. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
 3. Replaceable Seal Strips: Provide units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
- C. Weatherstripping - Products: Model 807 by Reese, 160 by National, 303 by Pemko, or approved equal.
- D. Rain Guard: Pemko 346-C; or approved equal.
- E. Sweep: 3452 Pemko; or approved equal.

2.18 THRESHOLDS

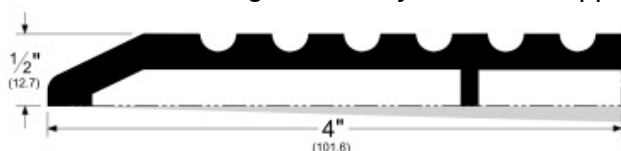
- A. Thresholds: ANSI A156.21, extruded aluminum, corrugated top. Continuous bumper seal insert in integral raised receiver. Include vinyl or neoprene resilient gasket strip.
1. Basis of Selection: 2005T by Pemko; or equivalent products by National, Reese, Zero, or approved equal.

- B. Saddle-Thresholds: ANSI A156.21, extruded aluminum with corrugated top, profile designed for handicap accessibility.

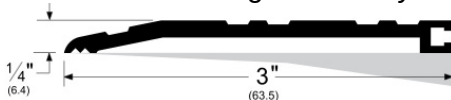
1. Types of Saddle Thresholds: Provide the following types for locations with types of flooring as indicated below. Type selected by Contractor in coordination with flooring types
 - a. Basis of Design products by Pemko as indicated below; or products by Hager, National, Reese, Zero, or approved equal.
2. Type for openings with resilient tile and exposed concrete.
 - a. 1/4-inch high x 5-inch width.
 - b. Basis of Design: 1665A by Pemko, or approved equal.



3. Type for openings with resilient tile and ceramic tile.
 - a. 1/2-inch high x 4-inch width.
 - b. Basis of Design: 227A by Pemko, or approved equal.



4. Type for openings with resilient tile and carpet.
 - a. 1/4-inch high x 3-inch width.
 - b. Basis of Design: 273A by Pemko, or approved equal.



2.19 FABRICATION

- A. Base Metals: Produce door hardware units of base metal, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

2.20 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
 - 1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Designations used to indicate hardware finishes are listed in ANSI A156.18. Unless noted otherwise, provide the following finishes for items noted:
 - 1. Hinges and Locksets:
 - a. Interior Doors: 626, satin chrome.
 - b. Exterior Doors: 630, satin stainless steel.
 - 2. Closers: 628, satin aluminum.
 - 3. Push/Pulls, Kickplates, Door Stops: 630, satin stainless steel.
 - 4. Others: 626, 630 or 628 for base metal of hardware furnished.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Make corrections to unsatisfactory conditions.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
 - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

- B. Wood Doors: Comply with DHI A115-W Series.
- C. Frameless Door Hardware: Coordinate with wall framing construction. Provide bracing and framing for rigid wall construction to receive concealed closer and related hardware components.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware at heights to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 - 3. Paint items, such as removable mullions and door guard plates, same color as door frame.
- C. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
 - 1. Install with fasteners provided with hardware units, or provide fastener type recommended by manufacturer. Do not use unauthorized fasteners, such as TEK fasteners for closers.
- E. Doorstops: Locate floor type doorstops close to wall to avoid traffic. Coordinate mounting location of wall bumpers with door lockset trim.
- F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."
- G. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.
- H. Key Control Cabinet: Obtain Owner's desired location, install and mount.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. Occupancy Adjustment: Approximately 3 months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors and door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation. Clean operating items as necessary to restore proper function and finish.
- B. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 HARDWARE SCHEDULE

- A. General: Develop, submit and provide hardware sets for each type of door use indicated in the door schedule in the drawings for door types and categories listed below.
 - 1. Where hardware sets are not designated, provide hardware set similar to door serving similar function in the building.
 - 2. Where door numbers are not designated, provide hardware set similar to door serving similar function in the building.
 - 3. Include hardware items where not indicated in hardware sets, but are obviously required for door assembly to work properly as intended.
 - 4. Provide UL labeled seal strips and adjustable door sweeps to all interior doors located at corridors and smoke partitions.
 - 5. Provide hardware of appropriate base metal and rating, and provide UL-rated closers to doors located at fire-rated partitions.
 - 6. Provide thresholds at flooring material changes if not specifically detailed in the drawings without threshold.
 - 7. Contractor to coordinate with Access Control prior to completing shop drawings to ensure a complete, operational system.

- B. Hardware Components for UL Label Door Assemblies: Comply with base metal, labeling, and UL requirements. Hardware Set No. 1:
1. Single occupancy toilet room. (206-1, 207-1, 204-1, 106-1, 110-1, 109-1, 105-1))
 - 1-1/2 pairs hinges
 - 1 each..... lockset, privacy
 - 1 each..... wallstop
 - 3 each..... mutes/silencers
 - 1 each..... threshold (only required at floor material change)
- D. Hardware Set No. 2:
1. Private Office. (117-1, 118-2, 114-1, 209-1, 213-1, 215-2, 214-1, 122-1, 117-2)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, office
 - 1 each..... wallstop
 - 3 each..... mutes/silencers
- E. Hardware Set No. 3:
1. Storage Room. (202-1, 208-1, 216-1, 212-1, 210-1, 107-1, 120-1, 115-1, 111-1, 112-1, 113-1, 199-22)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, Storage
 - 1 each..... wallstop
 - 3 each..... mutes/silencers
 - 1 each..... threshold (only required at floor material change)
- F. Hardware Set No. 3A:
1. Storage Room. (118-21)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, Storage
 - 1 each..... wallstop
 - 3 each..... mutes/silencers
 - 1 each..... kickplate
 - 1 each..... threshold (only required at floor material change)
- G. Hardware Set No. 4:
1. Exterior Storage Room (104-1, 114-05, 108-02, 119-07)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Storage
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... drip cap
 - 1 each..... kickplate
 - 1 each..... door sweep with drip

- H. Hardware Set No. 5:
1. Sleeping / Offices (smoke sealed) (104-10, 107-13)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, Office
 - 1 each..... smoke seal
 - 1 each..... closer
 - 1 each..... Bottom smoke seal sweep
- I. Hardware Set No. 6:
1. Interior Passage (205-1, 219-2, 121-2, 108-1, 112-19)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, Passage
 - 1 each..... wallstop
 - 3 each..... mutes/silencers
- J. Hardware Set No. 7:
1. Sleeping (smoke sealed) (111-15)
 - 1-1/2 pairs hinges
 - 1 each..... lockset, Passage
 - 1 each..... smoke seal
 - 1 each..... closer
 - 1 each..... Bottom smoke seal sweep
- K. Hardware Set No. 8:
1. Pair Storage Room (102-16, 102-17, 102-18, 108-14)
 - 3 pairs..... hinges
 - 1 each..... lockset, Storage
 - 1 set top & bottom bolts (recessed - inactive leaf)
 - 2 each..... Wallstop (108-14 Only)
 - 2 each..... mutes/silencers
- L. Hardware Set No. 9:
1. Storage Room w/seal (118-21, 117-22)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Storage
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... kickplate
 - 1 each..... door sweep
- M. Hardware Set No. 10:
1. Restroom w/seal (118-23)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Privacy
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... kickplate
 - 1 each..... door sweep

N. Hardware Set No. 11:

1. Passage w/seal (117-20)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Passage
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... kickplate
 - 1 each..... door sweep

O. Hardware Set No. 12:

1. Passage w/rating (101-12)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Passage
 - 1 each..... closer
 - 1 each..... smoke seal
 - 1 each..... threshold
 - 1 each..... kickplate
 - 1 each..... door sweep

P. Hardware Set No. 13:

1. Stairwell w/rating (203-1, 105-2)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Passage
 - 1 each..... Rim Panic Exit Device
 - 1 each..... closer
 - 1 each..... smoke seal
 - 1 each..... threshold
 - 1 each..... door sweep

Q. Hardware Set No. 14:

1. Stairwell w/rating (105-1, 116-1, 211-1)
 - 1-1/2 pairs..... hinges
 - 1 each..... lockset, Storage
 - 1 each..... Rim Panic Exit Device
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... drip cap
 - 1 each..... kickplate
 - 1 each..... door sweep with drip

R. Hardware Set No. 15:

1. Exterior Storefront (108-2, 118-1)
 - 1 each..... continuous hinge
 - 1 each..... lockset, Storage
 - 1 each..... Rim Panic Exit Device
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... drip cap
 - 1 each..... door sweep with drip

S. Hardware Set No. 15A:

1. Exterior Storefront (215-1, 219-1)
 - 1 each..... continuous hinge
 - 1 each..... lockset, Office
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... drip cap
 - 1 each..... door sweep with drip

T. Hardware Set No. 16:

1. Pair Exterior Storefront w/access control (101-1)
 - 2 each..... continuous hinge
 - 2 each..... Pull, exterior side of door
 - 2 each..... Rim Panic Exit Device
 - 2 each..... Electromagnetic Strike
 - 2 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 2 each..... drip cap
 - 2 each..... door sweep with drip
 - Access control by owner's contractor
 - Provide power as required

U. Hardware Set No. 17:

1. Single Interior w/access control (101-2)
 - 1-1/2 pairs..... hinges
 - 1 each..... Rim Panic Exit Device
 - 1 each..... Electromagnetic Strike
 - 1 each..... lockset, Passage (access control on Public side)
 - 1 each..... closer
 - 3 each..... mutes/silencers
 - Access control by owner's contractor
 - Provide power as required

V. Hardware Set No. 18:

1. Single Exterior Storefront w/access control (102-03, 100-01)
 - 1 each..... continuous hinge
 - 1 each..... lockset, Storage (access control on Public side)
 - 1 each..... Rim Panic Exit Device
 - 1 each..... Electromagnetic Strike
 - 1 each..... closer
 - 1 each..... weatherstripping (head and jambs)
 - 1 each..... threshold
 - 1 each..... drip cap
 - 1 each..... door sweep with drip
 - Access control by owner's contractor
 - Provide power as required

W. Hardware Set No. 19:

1. Single Interior dual swing w/access control (122-1, 218-1)
 - 1-1/2 pairs..... hinges (dual acting)
 - 1 each..... Rim Panic Exit Device
 - 1 each..... Electromagnetic Strike
 - 1 each..... lockset, Passage (access control on Public side)
 - 1 each..... closer
 - 3 each..... mutes/silencers
 - Access control by owner's contractor
 - Provide power as required

END OF SECTION 08 71 00

SECTION 088000 - 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. Doors.
 - 2. Glazed entrances.
 - 3. Interior borrowed lites.
 - 4. Storefront framing.

1.2 DEFINITIONS

- A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 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 Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 1/4 -inch- (6mm).
 - e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
 - C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 - D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 1/4-inch- (6.0 mm) thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite 1/4-inch- (6.0 mm) thick and a nominal 1/2-inch- (12.7-mm-) wide interspace.
 4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.
- 1.4 SUBMITTALS
- A. Product Data: For each glass product and glazing material indicated.
 - B. Samples: 12-inch- (300-mm-) square, for each type of glass product indicated, other than monolithic clear float glass.
 - C. Glazing Schedule: Use same designations indicated on Drawings.
 - D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

1.5 QUALITY ASSURANCE

- A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
- B. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- C. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Sloped Glazing Guidelines."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council or Associated Laboratories, Inc.
- F. Fire Protection Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance-rating in minutes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. For uncoated glass, comply with requirements for Condition A.
 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- B. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 3. Sealing System: Dual seal.
 4. Spacer Specifications: Manufacturer's standard spacer material and construction.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Corner Construction: Manufacturer's standard corner construction.

2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. EPDM, ASTM C 864.
 2. Silicone, ASTM C 1115.
 3. Thermoplastic polyolefin rubber, ASTM C 1115.
 4. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. EPDM.
 2. Silicone.
 3. Thermoplastic polyolefin rubber.
 4. Any material indicated above.

2.4 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: 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.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
- B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
 - b. Schott North America, Inc.; Laminated Pyran Crystal.
 - c. Vetrotech Saint-Gobain; SGG Keralite FR-L.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

2.9 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units: Class 1 (clear) Kind FT (fully tempered) float glass.
 - 1. Thickness: 1/4-inch(6.0 mm).
- B. Uncoated Tinted Float-Glass Units: Class 2 (tinted) Kind FT (fully tempered) float glass.
 - 1. Products:
 - a. **Basis of Design:** PPG Architectural glass
 - 2. Thickness: 1/4-inch (6.0 mm) .
 - 3. Tint Color: As selected by Architect from PPG Solargray;
 - 4. Visible Light Transmittance: .69 minimum.
 - 5. Solar Heat Gain Coefficient: .49 maximum.

2.10 INSULATING-GLASS UNITS

- A. Tinted Insulating-Glass Units with Hurricane Resistant Laminated Glass:
 - 1. Products:
 - a. **Basis of Design:** PPG Architectural Glass
 - 2. Overall Unit Thickness: 1-1/16-inch (28.0 mm).
 - 3. Interspace Content: 1/2-inch, Air.

4. Outboard Lite: Class 2 (tinted) float glass.
 - a. Tint Color: As selected by Architect from PPG Solargray.
 - b. Kind FT (fully tempered).
 - c. Coating: PPG Solarban 67 on Surface No. 2
 - d. Nominal Thickness: 1/4-inch (6.0 mm)
5. Inboard Lite: outer ply
 - a. Class 1 (clear) float glass.
 - b. Kind HS (heat strengthened).
 - c. Nominal thickness: 1/8-inch
6. Interlayer:
 - a. Type: PVB
 - b. Tint: Clear
 - c. Nominal Thickness: 0.090-inch
7. Inboard Lite: inner ply
 - a. Class 1 (clear) float glass.
 - b. Kind HS (heat strengthened).
 - c. Nominal thickness: 1/8-inch
8. Visible Light Transmittance: 27%
9. Visible Reflectance: 8%
10. Winter U-factor: 0.28
11. Solar Heat Gain Coefficient: 0.25 maximum.

PART 3 - EXECUTION

3.1 GLAZING

- A. General: Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
 1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
 2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
 3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
 4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 6. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 7. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

1. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 3. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 4. Apply cap bead of elastomeric sealant over exposed edge of tape.
- C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 3. Install gaskets so they protrude past face of glazing stops.
- D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 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. 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.
- B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08 80 00

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Exterior portland cement plasterwork (stucco) on metal lath and solid plaster bases.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of colored and textured finish coat indicated; 12 by 12 inches (305 by 305 mm), and prepared on rigid backing.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For portland cement plaster 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.
- B. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for each type of finish indicated.
 - 2. For interior plasterwork, simulate finished lighting conditions for review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork: Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 NONSTRUCTURAL STEEL FRAMING MEMBERS, GENERAL

- A. Components, General: Comply with ASTM C 1063. For steel sheet components not included in ASTM C 1063, comply with ASTM C 645 requirements for metal, unless otherwise indicated.
- B. Cold-Rolled Channels: Base metal thickness of 0.0538 inch (1.37 mm) with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
- C. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter, unless otherwise indicated.

2.3 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 1. Diamond-Mesh Lath: Self-furring (vertical surfaces); flat (horizontal surfaces).
 - a. Weight: 2.5 lb/sq. yd. (1.4 kg/sq. m).

2.4 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Zinc and Zinc-Coated (Galvanized) Accessories:
 1. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 2. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
 - a. Small-noseBull-nose style; use unless otherwise indicated.
 3. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
 4. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 5. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 6. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4-to-5/8-inch (6.34-to-16-mm) wide; with perforated flanges.

2.5 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

- B. Bonding Compound: ASTM C 932.
- C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.
- D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- E. 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.
- F. Isolation Strip at Exterior Walls:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), unperforated.
- G. 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.
 - 1. Products:
 - a. OSI Sealants, Inc.; Pro-Series, SC 175 Acoustical Sound Sealant Non-Flammable - Latex.
 - b. Pecora Corporation; AC-20 + Silicone.
 - c. Tremco Incorporated; Tremflex 834.
 - d. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- H. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
 - 1. Products:
 - a. OSI Sealants, Inc.; Pro-Series SC 170 Acoustical Sound Sealant - Solvent.
 - b. Pecora Corporation; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

2.6 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Color for Finish Coats: white.
- B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- C. Sand Aggregate: ASTM C 897.

- D. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.

1. Products:
 - a. Bonsal, W. R. Co.;
 - b. ChemRex, SonoWall Stucco Systems;
 - c. Dryvit Systems, Inc.;
 - d. Parex Incorporated;
2. Color: As selected by Architect from manufacturer's full range.

2.7 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- B. Portland Cement Base-Coat Mixes:
1. Over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
 - c. For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
- C. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare solid-plaster bases that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.2 INSTALLATION, GENERAL

- A. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

- B. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.3 INSTALLING NONSTRUCTURAL STEEL FRAMING, GENERAL

- A. General: Comply with requirements in ASTM C 1063 for applications indicated.
 - 1. Comply with ASTM C 754 for installation of items not addressed in ASTM C 1063.
- B. Install supplementary framing, blocking, and bracing at terminations in plaster assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.
- D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.
- E. Soffits: Unless otherwise detailed on Drawings, install furred or suspended soffits to comply with requirements for ceiling installation; install framed soffits to comply with requirements for partition installation.

3.4 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063.
 - 1. Partition Framing and Vertical Furring: Install self furring diamond-mesh lath.
 - 2. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath.
 - 3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
 - 4. On Solid Surfaces, Not Otherwise Furred: Install self-furring diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
 - 1. Install lath-type external-corner reinforcement at exterior locations.
 - 2. Install cornerbead at interior locations.
- C. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).
 - 2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.

3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
- B. Bonding Compound: Apply on unit masonry plaster bases.
- C. Plaster Finish Coats: Apply to provide float finish to match Architect's sample; interior stucco to match existing finish.
- D. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

3.7 CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing (check cracking), dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. Interior gypsum board.
2. Tile backing panels.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 3. Simulate finished lighting conditions for review of mockups.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.
- B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours before application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. G-P Gypsum.
 - b. National Gypsum Company.
 - c. Temple.
 - d. USG Corporation.
- B. Regular Type:
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.
- C. Type X:
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.
- D. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 - 1. Thickness: 1/4 inch (6.4 mm).
 - 2. Long Edges: Tapered.
- E. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 5/8" (15.9 mm).
 - 2. Long Edges: Tapered.
- F. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - 1. Core: 5/8 inch (15.9 mm), Type X.

2. Long Edges: Tapered.

2.2 TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum Co.
 - b. BPB America Inc.
 - c. G-P Gypsum.
 - d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple.
 - h. USG Corporation.
2. Core: 5/8 inch (15.9 mm), Type X

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.

- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified..

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. 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 beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose 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 Exterior Applications:
1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

3.2 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Vertical surfaces, unless otherwise indicated.
 - 2. Ceiling Type: Ceiling surfaces.
 - 3. Moisture- and Mold-Resistant Type: At janitors closets And unconditional spaces.

3.3 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 - 1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
 - 2. Fasten with corrosion-resistant screws.

3.4 APPLYING TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and behind tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: 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. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated].
 - 2. LC-Bead: Use at exposed panel edges
 - 3. Curved-Edge Cornerbead: Use at curved openings.
- C. Exterior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.

3.6 FINISHING GYPSUM BOARD

- A. General: 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. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile
 - 3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
 - b. Light orange peel texture
 - 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 09 31 00 - CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Ceramic floor and wall and base tile.
 - 2. Waterproof membrane for thin-set tile installations.
 - 3. Crack-suppression membrane for thin-set tile installations.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
 - 2. Division 7 - Sealants.
 - 3. Division 9 Section "Gypsum Board Assemblies".

1.2 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For floor tiles, provide products with values as determined by testing identical products per ASTM C 1028: Minimum 0.6.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification of Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of same type and color or finish from one source or producer.
 - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

- A. Tile Floor and Wall and Base Units: As indicated in Drawings.
- B. Trim Units: Coordinate with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - 1. External Corners: Surface bullnose, same size as adjoining flat tile.
 - 2. Internal Corners: Field-butt square corners.
 - 3. Base Units: Coved base and cap use angle pieces designed to fit with stretcher shapes.

2.2 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS

- A. General: Manufacturer's standard product that complies with ANSI A118.10, selected from any one the following at Contractor's option:-
- B. Polyethylene-Sheet Product: Polyethylene faced on both sides with fleece webbing for adhering to latex-portland cement mortar; 39 inches (1000 mm) wide by 0.008-inch (0.203-mm) nominal thickness.
 - 1. Product: Schluter Systems L.P.; KERDI.
- C. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement. Products:
 - 1. Custom Building Products; Trowel & Seal Waterproofing and Anti-Fracture Membrane.
 - 2. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane.
 - 3. MAPEI Corporation; PRP M19.
 - 4. Summitville Tiles, Inc.; S-9000.
- D. Unreinforced, Fluid-Applied Product: Liquid-latex rubber in a consistency suitable for trowel application and intended for use as waterproofing. Products:
 - 1. Boiardi Products Corporation; Elastiment [324] [644].
 - 2. Custom Building Products; LevelQuick Waterproofing and Anti-Fracture Membrane.
 - 3. Jamo Inc.; Waterproof.

- E. Latex-Portland Cement Product: Flexible mortar consisting of cement-based mix and acrylic-latex additive. Products:
 - 1. Boiardi Products Corporation; Elastiment 323.
 - 2. MAPEI Corporation; PRP 315.
 - 3. Southern Grouts & Mortars, Inc.; Southcrete 1100.
 - 4. TEC Specialty Products Inc.; TA-324, Triple Flex.
- F. Urethane Waterproofing and Tile-Setting Adhesive: One-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process. Products:
 - 1. Bostik; Hydroment Ultra-Set.
 - 2. Southern Grouts & Mortars, Inc.; Deck-Seal 1000.

2.3 SETTING AND GROUTING MATERIALS

- A. Portland Cement Mortar:
 - 1. Portland Cement: ASTM C-150 Type 1
 - 2. Sand: ASTM C144
 - 3. Water: potable
 - 4. Reinforcement: 6 gage (4 mm) welded wire mesh.
- B. Floor Setting Materials:
 - 1. Mortar Bed: ANSI 108.1A.
 - 2. Thin set: Latex Portland Cement mortar bond coat, ANSI A118.4.
- C. Organic Adhesive: ANSI A136.1
- D. Grout: Water-Cleanable, Tile-Setting and -Grouting Epoxy, ANSI A118.3.
- E. Manufacturers:
 - 1. Boiardi Products Corporation.
 - 2. Bonsal, W. R., Company.
 - 3. Bostik.
 - 4. C-Cure.
 - 5. Custom Building Products.
 - 6. DAP, Inc.
 - 7. LATICRETE International Inc.
 - 8. MAPEI Corporation.
 - 9. Southern Grouts & Mortars, Inc.
 - 10. Summitville Tiles, Inc.
 - 11. TEC Specialty Products Inc.

2.4 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures. Products:
 - 1. Dow Corning Corporation; Dow Corning 786.
 - 2. GE Silicones; Sanitary 1700.
 - 3. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - 4. Tremco, Inc.; Tremsil 600 White.

2.5 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout. Products:
 - 1. Bonsal, W. R., Company; Grout Sealer.
 - 2. Bostik; CeramaSeal Grout Sealer.
 - 3. C-Cure; Penetrating Sealer 978.
 - 4. Custom Building Products; Grout and Tile Sealer.
 - 5. MAPEI Corporation; KER [003, Silicone Spray Sealer for Cementitious Tile Grout.
 - 6. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - 7. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - 8. TEC Specialty Products Inc.; TA-257 Silicone Grout Sealer.

2.6 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Make correction so unsatisfactory conditions.

3.2 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. Provide concrete substrates for tile floors that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 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. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. 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.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. 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.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.

- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- H. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION

- A. Comply with waterproofing manufacturer's written installation instructions to produce a membrane of uniform thickness bonded securely to substrate. Install waterproof membrane to provide monolithic pan in each area.
- B. Extend waterproofing membrane up wall base to form waterproof envelope pan for each area. At door sills, extend up slab depression edge.
- C. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
- D. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.
- E. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
- B. Ceramic Floor Tile Installations
 - 1. Toilet Rooms: TCA F115, unless indicated otherwise; floor tile installed thinset over mortar bed over waterproof and crack suppression membrane on concrete floor substrate.
- C. Joint Widths: Install tile on floors with the following joint widths:
 - 1. 1/8 inch (3 mm), unless indicated otherwise.
- D. Grout: Epoxy, ANSI A108.6.

3.6 WALL and BASE TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.
- B. Wall Base Tile
 - 1. Water-Resistant Gypsum Board: TCA W245, unless indicated otherwise; tile installed with organic adhesive.
- C. Grout: Epoxy, ANSI A108.6.
 - 1. Omit grout at wall interior wall corners, and where tile abut construction such as door frames. Provide sealant at these joints.
- D. Joint Widths: Install tile on walls with the following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch (1.6 mm).

3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 31 00

SECTION 09 51 00 - ACOUSTICAL TILE CEILINGS

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 type of product indicated.
- B. Samples: For each exposed finish.

1.3 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.
 - a. Smoke-Developed Index: 450 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units.

1.5 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire alarm system, and partitions.

1.6 MANUFACTURER'S WARRANTY

- A. Provide warranty against grid support failure and sagging tiles under normal use.
 - 1. Warranty Period: 5 years.

1.7 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: Full-size tiles equal to 2.0 percent of quantity installed, but not less than 2 boxes of each type.
 - 2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, 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.
 - 1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch (2.69-mm) diameter wire.
- E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL TILES - Ceiling Type A

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Ultima Square Lay-In #1910, or a comparable product by one of the following:
 - 1. USG Interiors, Inc.
 - 2. BPB USA
- B. Performance Characteristics
 - 1. Modular Size: 24 by 24 inches (610 by 610 mm)
 - 2. Edge/Joint Detail: Square
 - 3. LR: Not less than .9

4. NRC: Not less than .70, Type E-400 mounting per ASTM E 795.
5. CAC: Not less than .35
6. Color: White

2.3 METAL SUSPENSION SYSTEM

A. Metal Suspension System, General

1. Metal Suspension System Standard: Manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
2. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
3. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
4. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - a. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - b. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
5. Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
6. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Prelude XL 15/16" exposed tee or a comparable product by one of the following:

1. USG Interiors, Inc.
2. BPB USA

C. Direct-Hung Suspension System: Intermediate-duty structural classification.

D. Access: Upward, with each access unit identified by manufacturer's standard unobtrusive markers.

E. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
2. Where ceilings abut wall, provide shadow mold trim.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut for compliance with requirements that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Make corrections to unsatisfactory conditions.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. Comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. 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. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 1. Do not support ceilings directly from floor deck; anchor into wood framing members.
 - 2. Do not attach hangers to steel deck tabs.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. 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.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
- G. Install acoustical panels with hold-down clips to areas around near doors opening to exterior.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 00

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Basis of Design: Subject to compliance with requirements of the product selected by Armstrong World Industries, Inc. as shown on the drawing shall be used, or a compatible product by one of the following:
 - a. Flexco, Inc.
 - b. Roppe Corporation, USA.

- B. Resilient Base Standard: ASTM F 861
 - 1. Material Requirement: Type TP (rubber thermoplastic)
 - 2. Manufacturing Method: Group I or Group II
 - 3. Style: Cove (base with toe)
- C. Minimum Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length (4' sections shall not be allowed)
- F. Outside Corners: Premanufactured
- G. Inside Corners: Job formed
- H. Finish:
- I. Colors and Patterns: As indicated by manufacturer's designations or selected by architect from manufacturer's full range if by other manufacturer.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type 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 instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Seams shall be a minimum of 4' from outside corners
- G. Place seams at inside corners whenever possible to minimize seams exposure on a flat wall.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 09 68 13 - CARPET TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes modular carpet tile and related accessories.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show the following:
 - 1. Carpet tile type, color, and dye lot.
 - 2. Pattern of installation.
 - 3. Edge, transition, and other accessory strips.
 - 4. Transition details to other flooring materials.
- C. Samples: For each color and texture required.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- E. Maintenance data.

1.3 QUALITY ASSURANCE

- A. General Standard: "Carpet Specifier's Handbook" by The Carpet and Rug Institute for general recommendations and information, and the following:
 - 1. CRI 104, Section 5, "Storage and Handling."
 - 2. CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet tiles 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. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.6 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, and delamination.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 10% percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Products: As indicated in Finish Schedule in Drawings.
 - 1. Color: Match Architect's samples.
 - 2. Pattern: Match Architect's samples.
 - 3. Source: Mohawk / Bigelow
 - 4. As scheduled on the drawings

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Carpet Edge Guard - Metal Edge Strips: Extruded aluminum with mill finish, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions

affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the carpet manufacturer.
 - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Make corrections unsatisfactory conditions.
- D. Sequence carpeting to minimize damage and soiling of carpet during construction period.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Apply sealer where required to prevent dusting.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- E. Install pattern parallel to walls and borders.
- F. Install edge guards where carpet edge are exposed. Anchor guards securely to substrate.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet. Comply with CRI 104, Section 15, "Protection of Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 68 13

SECTION 099113 - EXTERIOR PAINTS AND COATINGS

Part 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior paints and coatings systems including; paints, stains, transparent coatings, and opaque finishes.

1.2 RELATED SECTIONS

- A. Section 050513 - Shop Applied Coatings for Metal
- B. Section 060140 - Architectural Woodwork Refinishing
- C. Section 060583 - Shop Applied Wood Coatings
- D. Section 071900 - Water Repellents.
- E. Section 096700 - Fluid Applied Flooring for Concrete
- F. Section 099300 - Stains and Transparent Finishes
- G. Section 099600 - High-Performance Coatings

1.3 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning
- B. SSPC-SP 2 - Hand Tool Cleaning
- C. SSPC-SP 3 - Power Tool Cleaning
- D. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete
- E. EPA-Method 24
- F. OTC-Regulation No. 41

1.4 SUBMITTALS

- A. Submit under provisions of Section 013300, Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each paint and coating product should include:
 - 1. Product characteristics
 - 2. Surface preparation instructions and recommendations
 - 3. Primer requirements and finish specification
 - 4. Storage and handling requirements and recommendations
 - 5. Application methods
 - 6. Cautions
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color samples available.

- D. Verification Samples: For each finish product specified, submit samples that represents actual product, color, and sheen.

1.5 MOCK-UP

Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of painting on the project.

- A. Finish surfaces for verification of products, colors, & sheens.
- B. Finish area designated by Architect.
- C. Provide samples that designate prime & finish coats.
- D. Do not proceed with remaining work until the Architect approves the mock-up samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
 - 1. Product name, type (description)
 - 2. Application & use instructions
 - 3. Surface preparation
 - 4. VOC content
 - 5. Environmental issues
 - 6. Batch date
 - 7. Color number
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

Part 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Basis of design.
The Sherwin-Williams Company
101 Prospect Avenue NW
Cleveland, OH 44115
Tel: (800) 321-8194
Fax: (216) 566-1392
www.sherwin-williams.com

- B. Other acceptable manufacturers:
Benjamin Moore
ICI

- C. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 016000 Product Requirements.
When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

2.2 APPLICATIONS/SCOPE

- A. Use this article to define the scope of painting if not fully defined in a Finish Schedule or on the drawings. This article must be carefully edited to reflect the surfaces actually found on the project. In some cases, it may be enough to use the first paragraph that says, in effect, "paint everything" along with a list of items not to paint, without exhaustively defining all the different surfaces and items that must be painted.
- B. If the project involves repainting some but not all existing painted surfaces, be sure to indicate the extent of the repainting.
- C. The descriptions of each system can also be used to further refine the definition of what is to be painted, stained, or clear finished.

2.3 MATERIALS - GENERAL REQUIREMENTS

- A. Paints and Coatings - General:
 - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
- B. Primers:
 - 1. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.4 ACCESSORIES:

- A. Coating Application Accessories:
 - 1. Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required per manufacturer's specifications.

Part 2 EXECUTION

3.1 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared. Notify Architect of unsatisfactory conditions before proceeding
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- C. Proceed with work only after conditions have been corrected, and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.2 SURFACE PREPARATION:

- A. Proper product selection, surface preparation, and application affect coating performance. Coating integrity and service life will be reduced because of improperly prepared surfaces. Selection and implementation of proper surface preparation ensures coating adhesion to the substrate and prolongs the service life of the coating system.
- B. Selection of the proper method of surface preparation depends on the substrate, the environment, and the expected service life of the coating system. Economics, surface contamination, and the effect on the substrate will also influence the selection of surface preparation methods.
- C. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
- D. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
- E. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50°F, unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50°F or higher to use low temperature products.
- F. Methods:
 - 1. Aluminum
Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
 - 2. Block (Cinder and Concrete)
Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75°F. The pH of the surface should be between 6 and 9, unless the products to be used are designed to be used in high pH environments such as Loxon. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
 - 3. Concrete, SSPC-SP13 or NACE 6
This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

4. **Cement Composition Siding/Panels**
Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products to be used are designed to be used in high pH environments such as Loxon.
5. **Exterior Composition Board (Hardboard)**
Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.
6. **Galvanized Metal**
Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP7 is necessary to remove these treatments.
7. **Steel: Structural, Plate, etc.**
Should be cleaned by one or more of the ten surface preparations described below. These methods were originally established by the Steel Structures Painting Council in 1952, and are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Steel Structures Painting Council; ask for SSPC-VIS 1-89. A brief description of these standards together with numbers by which they can be specified follow.
8. **Solvent Cleaning, SSPC-SP1**
Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
9. **Hand Tool Cleaning, SSPC-SP2**
Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
10. **Power Tool Cleaning, SSPC-SP3**
Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
11. **White Metal Blast Cleaning, SSPC-SP5 or NACE 1**
A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.

12. Commercial Blast Cleaning, SSPC-SP6 or NACE 3
A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
13. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4
A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
14. Power Tool Cleaning to Bare Metal, SSPC-SP11
Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
15. Near-White Blast Cleaning, SSPC-SP10 or NACE 2
Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
16. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials
SSPC-SP12 or NACE 5
This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
17. Water Blasting, NACE Standard RP-01-72
Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
18. Stucco
Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9, unless the products to be used are designed to be used in high pH environments such as Loxon.
19. Wood—Exterior
Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.
20. Vinyl Siding, Architectural Plastics, and Fiberglass

Clean thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color. Painting with darker colors may cause siding to warp.

3.3 INSTALLATION

- A. Apply all coatings and materials with manufacture specifications in mind. Mix and thin coatings according to manufacture recommendation.
- B. Do not apply to wet or damp surfaces.
 - 1. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days.
 - 2. Test new concrete for moisture content.
 - 3. Wait until wood is fully dry after rain or morning fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Exterior Woodwork: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 2 weeks.
- H. Inspection: The coated surface must be inspected and approved by the architect or engineer just prior to each coat.

3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

3.5 SCHEDULES

- A. CEMENT (Stucco)
 - 1st Coat: S-W Loxon® Block Surfacer, A24W00200, 16 mils wet, 8 mils dry.
 - 2nd Coat: S-W Loxon® XP Exterior Waterproofing Systems, A24 Series, 14 – 18 mils wet, 6.4 – 8.3 mils dry.
 - 3rd Coat: S-W Loxon® XP Exterior Waterproofing Systems, A24 Series, 14 – 18 mils wet, 6.4 – 8.3 mils dry.
- B. MASONRY (Concrete Masonry Units Cinder or Concrete Block)
 - 1st Coat: S-W Loxon® Block Surfacer, A24W00200, 16 mils wet, 8 mils dry.
 - 2nd Coat: S-W Loxon® XP Exterior Waterproofing Systems, A24 Series, 14 – 18 mils wet, 6.4 – 8.3 mils dry.

3rd Coat: S-W Loxon® XP Exterior Waterproofing Systems, A24 Series, 14 – 18 mils wet,
6.4 – 8 mils dry.

C. CEMENT (Cementitious Siding/Wood)

1st Coat: S-W Loxon® Concrete & Masonry Primer, A24W8300.

2nd Coat: S-W A-100 Exterior Gloss.

3rd Coat: S-W A-100 Exterior Gloss.

D. METAL (Exposed Exterior Steel)

1st Coat: S-W Pro Industrial Pro-Cryl Universal Metal Primer, B66W310.

2nd Coat: S-W Pro Industrial Urethane Alkyd Enamel, B54W150.

3rd Coat: S-W Pro Industrial Urethane Alkyd Enamel, B54W150.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTS AND COATINGS

Part 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior paint and coatings systems including; paint, stains, transparent coatings, and opaque finishes.

1.2 RELATED SECTIONS

- A. Section 050513 - Shop Applied Coatings for Metal
- B. Section 060140 - Architectural Woodwork Refinishing
- C. Section 060583 - Shop Applied Wood Coatings
- D. Section 071900 - Water Repellents.
- E. Section 096700 - Fluid Applied Flooring for Concrete
- F. Section 099300 - Stains and Transparent Finishes
- G. Section 099600 - High-Performance Coatings

1.3 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning
- B. SSPC-SP 2 - Hand Tool Cleaning
- C. SSPC-SP 3 - Power Tool Cleaning
- D. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete
- E. EPA-Method 24

1.4 SUBMITTALS

- A. Submit under provisions of Section 013300, Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each paint and coating product should include:
 - 1. Product characteristics
 - 2. Surface preparation instructions and recommendations
 - 3. Primer requirements and finish specification
 - 4. Storage and handling requirements and recommendations
 - 5. Application methods
 - 6. Cautions
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color samples available.

- D. Verification Samples: For each finish product specified, submit samples that represents actual product, color, and sheen.

1.5 MOCK-UP

Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of painting on the project.

- A. Finish surfaces for verification of products, colors, & sheens.
- B. Finish area designated by Architect.
- C. Provide samples that designate prime & finish coats.
- D. Do not proceed with remaining work until the Architect approves the mock-up samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufactures name, label, and the following list of information:
 - 1. Product name, type (description)
 - 2. Application & use instructions
 - 3. Surface preparation
 - 4. VOC content
 - 5. Environmental issues
 - 6. Batch date
 - 7. Color number
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

Part 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Basis of design.
 - The Sherwin-Williams Company
 - 101 Prospect Avenue NW
 - Cleveland, OH 44115
 - Tel: (800) 321-8194
 - Fax: (216) 566-1392
 - www.sherwin-williams.com

- B. Other acceptable manufacturers
Benjamin Moore
ICI
- C. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 016000 Product Requirements.
 - 1. When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

2.2 APPLICATIONS/SCOPE

- A. Use this article to define the scope of painting if not fully defined in a Finish Schedule or on the drawings. This article must be carefully edited to reflect the surfaces actually found on the project. In some cases, it may be enough to use the first paragraph that says, in effect, "paint everything" along with a list of items not to paint, without exhaustively defining all the different surfaces and items that must be painted.
- B. If the project involves repainting some but not all existing painted surfaces, be sure to indicate the extent of the repainting.
- C. The descriptions of each system can also be used to further refine the definition of what is to be painted, stained, or clear finished.

2.3 MATERIALS - GENERAL REQUIREMENTS

- A. Paints and Coatings - General:
 - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
- B. Primers:
 - 1. Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.4 ACCESSORIES

- A. Coating Application Accessories:
 - 1. Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required per manufacturer's specifications.

Part 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared. Notify Architect of unsatisfactory conditions before proceeding.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Proceed with work only after conditions have been corrected, and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.2 SURFACE PREPARATION:

- A. Proper product selection, surface preparation, and application affect coating performance. Coating integrity and service life will be reduced because of improperly prepared surfaces. Selection and implementation of proper surface preparation ensures coating adhesion to the substrate and prolongs the service life of the coating system.
- B. Selection of the proper method of surface preparation depends on the substrate, the environment, and the expected service life of the coating system. Economics, surface contamination, and the effect on the substrate will also influence the selection of surface preparation methods.
- C. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
- D. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
- E. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50°F unless the specified product is designed for the marginal conditions.
- F. Methods
 - 1. Aluminum
Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
 - 2. Block (Cinder and Concrete)
Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75°F. The pH of the surface should be between 6 and 9, unless the products to be used are designed to be used in high pH environments such as Loxon. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
 - 3. Concrete, SSPC-SP13 or NACE 6
This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
 - 4. Cement Composition Siding/Panels
Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products to be used are designed to be used in high pH environments such as Loxon.

5. Copper and Stainless Steel
Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.
6. Drywall—Interior
Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
7. Galvanized Metal
Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP7 is necessary to remove these treatments.
8. Plaster
Must be allowed to dry thoroughly for at least 30 days before painting. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.
9. Steel: Structural, Plate, etc.
Should be cleaned by one or more of the ten surface preparations described below. These methods were originally established by the Steel Structures Painting Council in 1952, and are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Steel Structures Painting Council; ask for SSPC-VIS 1-89. A brief description of these standards together with numbers by which they can be specified follow.
10. Solvent Cleaning, SSPC-SP1
Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
11. Hand Tool Cleaning, SSPC-SP2
Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP
12. Power Tool Cleaning, SSPC-SP3
Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
13. White Metal Blast Cleaning, SSPC-SP5 or NACE 1
A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.

14. Commercial Blast Cleaning, SSPC-SP6 or NACE 3
A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
15. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4
A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
16. Power Tool Cleaning to Bare Metal, SSPC-SP11
Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
17. Near-White Blast Cleaning, SSPC-SP10 or NACE 2
A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
18. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials
SSPC-SP12 or NACE 5
This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
19. Water Blasting, NACE Standard RP-01-72
Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
20. Vinyl Siding, Architectural Plastics, and Fiberglass
Clean thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color. Painting with darker colors may cause siding to warp.
21. Wood
Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

- A. Apply all coatings and materials with manufacture specifications in mind. Mix and thin coatings according to manufacture recommendation.
- B. Do not apply to wet or damp surfaces.
 - 1. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days.
 - 2. Test new concrete for moisture content.
 - 3. Wait until wood is fully dry after rain, fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Exterior Woodwork: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 2 weeks.
- H. Inspection: The coated surface must be inspected and approved by the architect or engineer just prior to each coat.

3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

1.5.1 SCHEDULES

A. METAL (Exposed Steel Framing & Detailing)

1st Coat:	S-W Pro Industrial Pro-Cryl Universal Metal Primer, B66W310.
2nd Coat:	S-W Pro Mar 200 Alkyd Semi-Gloss, B34W200.
3rd Coat:	S-W Pro Mar 200 Alkyd Semi-Gloss, B34W200.

B. DRYWALL (Gypsum Board)

1st Coat:	S-W Pro Mar 200 Wall Primer, B28W8200.
2nd Coat:	S-W Pro Mar 200 Interior Latex, Eg-Shell, B20W2600.
3rd Coat:	S-W Pro Mar 200 Interior Latex, Eg-Shell, B20W2600.

C. WOOD TRIM

1st Coat:	S-W Promar 200, Primer
2nd Coat:	S-W Promar 200 Interior Latex, Gloss, B31W2600
3rd Coat:	S-W Promar 200 Interior Latex, Gloss, B31W2600

D. MASONRY (Concrete Masonry Units)

1st Coat:	S-W Loxon Block Surfacers, A24W00200, 16 mils wet, 8 mils dry.
2nd Coat:	S-W ProMar 200 Interior Latex, Semigloss, B31W2600.
3rd Coat:	S-W ProMar 200 Interior Latex, Semigloss, B31W2600.

END OF SECTION 099123

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. Plaques.
2. Dimensional characters.

1.2 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 2. Provide message list, typestyles, graphic elements including tactile characters and Braille, and layout for each sign.
- C. Samples: For each sign type and for each color and texture required.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and with code provisions as accepted by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Acrylic Sheet and cast acrylic Type II Braille: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- C. Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

2.2 PLAQUES

- A. Basis-of-Design Product: Subject to compliance with requirements provide ImPressions by ASI Modalex or a comparable product by one of the following:
1. Advance Corporation; Braille-Tac Division.
 2. A. R. K. Ramos.
 3. Gemini Incorporated.
 4. Matthews International Corporation; Bronze Division.
 5. Metal Arts; Div. of L&H Mfg. Co.
 6. Mills Manufacturing Company.
 7. Nelson-Harkins Industries.
 8. Southwell Company (The).
- B. Plaques: Provide plaques free of pits, scale, sand holes, and other defects, as follows:
1. Plaque Material: Acrylic Sheet.
 2. Colors and Graphics: Dark Gray
 3. Edges and Raised Features: White
 4. Mounting: Counter-sunk hole

2.3 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
1. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy, background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs and accessories as noted below or as required by local jurisdiction, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
 - 3. Install plaque signs in the following locations and as required by local authorities having jurisdiction. Coordinate final location / height in field with architect.
 - a. Restrooms / Toilet Rooms
 - b. Laundry Room
 - c. Building Egress Signs
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
 - 3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
 - 4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 - 5. Shim Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - 6. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

3.2 SCHEDULE - SIGNS

- A. Plaque Signs - provide shop drawings prior to fabrication
 - 1. All rooms not specifically listed below: 1 square plaque sign with 4 digit alpha-numeric characters for room identification and room name for each. Include Braille lettering.
 - 2. Architect to coordinate final room names with contractor during shop drawing submittal.
 - 3. Toilet Rooms: 1 square plaque sign picture symbol (Men or Women) sign for each toilet room, including access symbol. Provide message "Men" or "Women" as required, including Braille lettering
 - 4. Building Egress Doors to Exterior: Code required "EXIT" panel signs with Braille for building exit doors to exterior. One sign per door.

END OF SECTION 101400

SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

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. Cast dimensional characters.

1.3 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For dimensional letter signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
 - 4. Show locations of electrical service connections.
 - 5. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Revise list below to suit Project. Insert specific sign Samples and sizes if required.
 - 2. Dimensional Characters: Half-size Sample of each type of dimensional character.
 - 3. Exposed Accessories: Full-size Sample of each accessory type.

- E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
 - 1. Basis of Design Product: Subject to compliance with requirements, provide cast aluminum letters by Gemini Incorporated or a comparable product by one of the following:
 - a. ACF Sign Systems
 - b. ASI – Modulux, Inc.

- c. Bunting Graphics
- d. Charleston Industries, Inc.
- e. Grimco, Inc.
- f. Innerface Sign Systems, Inc.
- g. Mills Manufacturing Company
- h. Mohawk Sign Systems
- i. Nelson-Harkins, Industries
2. Character Material: Cast aluminum.
3. Character Height: As indicated.
4. Thickness: Manufacturer's standard for size of character 1/2" minimum.
5. Finishes:
 - a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
6. Mounting: Projecting studs.
7. Typeface: Helvetica.

2.2 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use flathead countersunk screws and bolts with tamper-resistant Allen-head spanner-head one-way-head slots unless otherwise indicated.
4. Sign Mounting Fasteners:
 - a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Internally brace signs for stability and for securing fasteners.
 - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
 - 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.6 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.7 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 2. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
 - 1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the

stud ends in holes. Temporarily support sign in position until adhesive fully sets.

- b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101419

SECTION 102113 - STAINLESS-STEEL TOILET COMPARTMENTS

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 stainless-steel toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for blocking
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
 - 6. Show overhead support or bracing locations.
- C. Samples for Initial Selection: For each type of toilet compartment material indicated.
 - 1. Include Samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Door Hinges: One hinge(s) with associated fasteners.
 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
 3. Door Bumper: One door bumper(s) with associated fasteners.
 4. Door Pull: One door pull(s) with associated fasteners.
 5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 STAINLESS-STEEL TOILET COMPARTMENTS

- A. Basis of Design: General Partitions – Diamond Pattern
- B. Additional Manufacturers

1. Bradley Corporation
 2. Bobrick
 3. ASI Global
- C. Toilet-Enclosure Style: Overhead braced & Floor anchored
- D. Urinal-Screen Style: Wall hung flat panel & Floor anchored
- E. Door, Panel, and Pilaster Construction: Seamless, Textured metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units of size and material adequate for panel to withstand applied downward load on grab bar of at least 250 lbf (1112 N), when tested according to ASTM F 446, without deformation of panel.
 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
- F. Urinal-Screen Construction:
1. Flat-Panel Urinal Screen: Matching panel construction.
 2. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum 1-1/4 inches (32 mm) thick.
 3. Wedge-Shaped, Wall-Hung Urinal Screen: Similar to panels, V-shaped, fabricated for concealed wall attachment, and maximum 6 inches (152 mm) wide at wall and minimum 1 inch (25 mm) wide at protruding end.
- G. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch (0.95 mm).
 2. Panels: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm)
 3. Doors: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).
 4. Flat-Panel Urinal Screens: Thickness matching the panels.
- H. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.
- I. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.

J. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; stainless steel.

K. Stainless-Steel Finish: Diamond Texture on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.

1. Material: Stainless steel
2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

B. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

C. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.

- a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Public-use washroom accessories.
 - 2. Public-use shower room accessories.
 - 3. Underlavatory guards.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule:
 - 1. Identify locations using room designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following (Basis-of-Design Listed):
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Bradley Corporation.
- B. Toilet Tissue (Roll) Dispenser Bradley 5234:
 - 1. Description: Double-roll dispenser.
 - 2. Mounting: Surface mounted.
 - 3. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Paper Towel (Folded) Dispenser Bobrick B-2620:
 - 1. Mounting: Surface mounted.
 - 2. Minimum Capacity: 400 C-fold or 525 multifold towels.
 - 3. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 4. Lockset: None.
- D. Liquid-Soap Dispenser Bradley 6563:
 - 1. Description: Designed for dispensing soap in liquid form.
 - 2. Mounting: Vertically oriented, surface mounted.
 - 3. Capacity: 40 fl oz (1.2L)
 - 4. Lockset: non lockable.
 - 5. Refill Indicator: Window type.
- E. Grab Bar Bradley 812:

1. Mounting: Flanges with concealed fasteners.
2. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
3. Outside Diameter: 1-1/2 inches (38 mm).
4. Configuration and Length: As indicated on Drawings.

F. Mirror Unit Bradley 781:

1. Frame: Stainless-steel channel.
 - a. Corners: Manufacturer's standard.
2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
3. Size: As indicated on Drawings.

G. Floor Standing Waste Receptacle with Open Top Bobrick B-2280

1. Minimum Capacity: 21 Gallons.
2. Material and Finish: Stainless Steel, No. 4 finish (satin).

2.2 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation.
- B. Shower Curtain Rod:
1. Description: 1-1/4-inch (32-mm) OD; fabricated from nominal 0.05-inch- (1.3-mm-) thick stainless steel.
 2. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.
 3. Finish: No. 4 (satin).
- C. Shower Curtain:
1. Size: Minimum 6 inches (152 mm) wider than opening by 72 inches (1828 mm) high.
 2. Material: Vinyl, minimum 0.006-inch- (0.15-mm-) thick, opaque, matte.
 3. Color: White.
 4. Grommets: Corrosion resistant at minimum 6 inches (152 mm) o.c. through top hem.
 5. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
- D. Folding Shower Seat:
1. Configuration: L-shaped seat, designed for wheelchair access.
 2. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect
 3. Mounting Mechanism: Stainless steel, No. 4 finish (satin)

- E. Towel/ Robe Hook
 - 1. Basis-of-Design Product: Ginger #2810Q and #2810D
 - a. Finish: Satin Nickel.
 - b. All single toilet restrooms with showers to have 2810D (minimum 2 hooks)
 - c. Group restroom in Station – 2810Q in lavatory area and 2810D (2 hooks) at each shower location.
 - 2. Equal Manufacturer: Mockett #HK4B and #HK4C

2.3 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. TCI Products.
 - 3. Truebro, Inc.
- B. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies, that prevent direct contact with and burns from piping, and allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded-plastic, white.
 - 3. Install at lavatory locations where piping is exposed.

2.4 FABRICATION

- A. Keys: All fixtures are to be provided **WITHOUT** locking capability per Owner's request. All accessories shall be installed in the unlocked position with no key required for operation or opening.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Shapes: ASTM B 221 (ASTM B 221M).
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Copper-Alloy Brass Sheet: ASTM B 36/B 36M, alloy UNS No. C26000 (cartridge brass, 70 percent copper).
- E. Copper-Alloy Bronze Sheet: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal, 60 percent copper).
- F. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick.

- G. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).
- H. Acrylic Bubble: One piece.

2.2 FIRE PROTECTION CABINET FEC

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. J. L. Industries, Inc., a division of Activar Construction Products Group;
 - b. Larsen's Manufacturing Company;
 - c. Potter Roemer LLC;
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.
- D. Semi recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Rolled-Edge Trim: 4-inch (102 mm) backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Fully glazed, frameless, backless, acrylic panel.
- H. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle (Non-lockable).
 - 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire protection cabinet with the words FIRE EXTINGUISHER.
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Silk-screened or manufacturers standards.
 - 3) Lettering Color: White.
 - 4) Orientation: Vertical.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door and trim, except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
2. Steel: Baked enamel or powder coat.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Install fire protection cabinets in locations and at mounting heights indicated[or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.
- C. Warranty: Sample of special warranty.

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.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Larsen's Manufacturing Company.
 - c. Potter Roemer LLC.
 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: UL-rated 10 lbs nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Larsen's Manufacturing Company.
 - c. Potter Roemer LLC.
 - B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 105030 - WALL MOUNTED TURNOUT GEAR LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Design, fabrication and installation of wall mounted turnout gear lockers as specified herein

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Shop Drawings: Submit manufacturer's shop drawings for each individual run of lockers.
- C. Samples: Submit manufacturer's full line of color samples.
- D. Owner's Manual: Provide maintenance manual at closeout.
- E. Warranty: Submit manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

- A. Installer shall have experience in locker installation.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers with labels identifying product and manufacturer's name.
- B. Storage: Store materials in a clean dry area.
- C. Handling: Protect materials and finish during installation and handling to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. BASIS OF DESIGN: Mid-Minnesota Wire (GearGrid Product Line), 670 SW 15th Street, Forest Lake, MN 55025. Toll-free 888-643-6694. Phone 651-464-4468. Fax 651-464-4780. Web site www.geargrid.com. Email sales@geargrid.com.
- B. Equal Manufacturer: Groves Incorporated: Ready Rack Wall Mounted Rack

2.2 TURNOUT GEAR LOCKERS

- A. Model: GEARGRID Wall Mounted Storage System
- B. Locker Sizes:
 - 1. Jumbo 24" Opening: Overall dimension 79"H x 25.25"W x 20"D
 - 2. Clear Opening Width: 22.75"
- C. Construction: Units shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock-down shipping, securing units to mounting surface and on applicable accessories.
- D. Vertical Dividers
 - 1. Outer Frames: 1.25" O.D. x 16 gauge wall thickness ASTM A513 steel tubing
 - 2. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern
- E. Back Panel:
 - 1. Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern
- F. Shelves: 1) Top, (1) Bottom. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed. Top shelf includes a 20 gauge steel bracket to accept a 2" x 16" name placard.
- G. Apparel Hooks: (3) per opening. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed

2.3 ACCESSORIES

- A. Door
 - 1. Frame: 1.25" O.D. x 16 gauge wall thickness ASTM A513 steel tubing.
 - 2. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 - 3. Top Cover: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 - 4. Hinge: Single pin welded style with brass pivot bushing
 - 5. Placard Channel: 20 gauge steel to accept a 2" x 12" name placard
 - 6. Latch/Hasp: Self-latching with padlock hasp. Lock by owner
- B. Horizontal Hanging Bar
 - 1. Tube: 1.25" O.D. x 16 gauge 304 stainless steel tubing.
 - 2. Brackets: Attach to side mesh, powder coated

2.4 FINISH

- A. General: All system components excluding assembly and mounting hardware and stainless steel components are to receive the standard finish
- B. Standard Finish: Components to be cleaned using a phosphatized bath, clear water rinse and electro-statically coated with a durable TGIC powder coating

- C. Color to be selected by architect from manufacturers full line of colors

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lockers. Notify architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers in accordance with manufacturer's instructions
- B. Use manufacturer's hardware for assembly
- C. Anchor to mounting surface with proper hardware

END OF SECTION 105030

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standard metal lockers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.
- C. Maintenance data.
- D. Warranty: Sample of special warranty.

1.3 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Warranty Period for Knocked-Down Metal Lockers: two years from date of Substantial Completion.
 - 2. Warranty Period for All-Welded Metal Lockers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Expanded Metal: ASTM F 1267, Type II (flattened), Class I, 3/4-inch (19-mm) steel mesh, with at least 70 percent open area.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- D. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 STANDARD METAL LOCKERS

- A. Products: Subject to compliance with requirements, provide one of the following:
1. ASI Storage Solutions Inc.; Traditional Collection.
 2. DeBourgh Mfg. Co.; Worley Lockers.
 3. Hadrian Manufacturing Inc.; Emperor Lockers.
 4. Lyon Workspace Products, LLC; Standard Lockers.
 5. Penco Products, Inc.; vanguard Lockers.
- B. Locker Arrangement: Double tier.
- C. Material: cold rolled steel sheet.
- D. Body and Shelves: Assembled by riveting or bolting body components together. Fabricate from unperforated 0.024-inch (0.61-mm) nominal-thickness steel sheet.
- E. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
- F. Doors: One piece; fabricated from 0.060-inch (1.52-mm) nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
 2. Doors for box lockers less than 15 inches (381 mm) wide may be fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
 3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
 4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet; welded to inner face of doors.
 5. Door Style: Louvered vents at top and bottom.
- G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Continuous Hinges: Manufacturer's standard, steel, full height.
 - 2.
- H. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.

- b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- I. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:
 - 1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- J. Accessories:
 - 1. Continuous Zee Base: Fabricated from manufacturer's standard thickness, but not less than 0.060-inch (1.52-mm) nominal-thickness steel sheet.
 - a. Height: 4 inches (102 mm).
 - 2. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch (0.91-mm) nominal-thickness steel sheet.
 - a. Closures: Vertical-end type.
 - 3. Individual Sloping Tops: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet.
 - 4. Recess Trim: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.
 - 5. Filler Panels: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch (0.91-mm) nominal-thickness steel sheet.
 - 6. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet.
- K. Finish: Baked enamel or powder coat.
 - 1. Color(s): As selected by Architect from manufacturer's full range.

2.3 FABRICATION

- A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.
- C. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for preassembly at plant prior to shipping.

- D. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.
- E. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
- F. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch (9 mm) high.
- G. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.
- H. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
- I. Recess Trim: Fabricated with minimum 2-1/2-inch (64-mm) face width and in lengths as long as practical; finished to match lockers.
- J. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- K. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
- L. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.4 STEEL SHEET FINISHES

- A. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.
- B. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 - 3. Anchor back-to-back metal lockers to floor.

- B. Knocked-Down Metal Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.
- C. All-Welded Metal Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.
- D. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - 4. Attach recess trim to recessed metal lockers with concealed clips.
 - 5. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 6. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 7. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

END OF SECTION 105113

SECTION 10 73 00 - ALUMINUM CANOPIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes a fabricated wall-mounted aluminum canopies.

1.2 SUBMITTALS

- A. Product Data and Shop Drawings: Submit shop drawings for fabrication and erection of canopy. Include manufacturer's product information concerning material data indicating compliance with these requirements, drainage, anchorage and accessory items.
- B. Submit manufacturer's information and/or calculations demonstrating that the system will be able to withstand code required loads. Clearly indicate components, tables and code required loads (i.e. live, dead and wind).

1.3 SINGLE SOURCE RESPONSIBILITY

- A. Canopy assembly including anchorage items shall be the product of one manufacturer.

PART 2 - PRODUCTS

2.1 CANOPY

- A. Manufacturer: Subject to compliance with project requirements, provide canopy system by one of the following, or approved equal:
 - 1. ACR Extruded System
 - 2. AllState Canopies
 - 3. AVADek
 - 4. E. L. Burns, Inc.
 - 5. Mason Corporation
 - 6. Perfection Architectural Systems, Inc.
 - 7. Peachtree Protective Covers.
- B. Materials:
 - 1. Aluminum Members: Extruded aluminum rigid bents, fascia gutter and deck sections; 6063 T-6 aluminum alloy; members sized to withstand live, dead and installation loads.
 - 2. Fasteners: Aluminum or 18-8 stainless steel as recommended by manufacturer.
 - 3. Grout: 2,000 psi compressive strength.
- C. Fabrication: Edges and sections neatly cut, true and smooth. Factory-weld with neatly mitered corners, smooth and uniform welds with 100% weld penetration. Fabricate canopy system to drain precipitation from deck to gutter/fascia/beam and to spout outlets.
- D. Deck: Interlocking modules fastened creating a monolithic structural unit.
 - 1. Deck Profile Thickness: 4-1/2-inches, unless indicated otherwise.

- E. Wall-hung Canopy: Prefabricated deck, fascia/gutter with drainage spouts and support construction as indicated in the drawings. Construct canopy for positive drainage. Design canopy to withstand code required live load of 20 psf and wind loading of 30 psf as well as construction loads. Factory finish with white enamel coating.

- 1. Attachments and Bolts: Stainless steel, size recommended by manufacturer for installation indicated.

- F. Finish: AA-M10-C22-A21, clear anodized aluminum.

2.2 MISCELLANEOUS

- A. Flashing: 0.040" thick aluminum, finish to match canopy.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Cut and patch existing construction to provide bracing in wall.

3.2 INSTALLATION

- A. Install plumb and level in accordance with manufacturer's instructions and as indicated.
- B. Flash juncture between canopy and wall. Seal at juncture and where anchorage penetrate wall to maintain watertightness of installation. Extend metal flashing a minimum of 3" past each end of the canopy.
- C. Set roof deck and fascia/gutter for positive drainage to drain spouts.
- D. Clean surfaces upon completion. Touch-up marred surfaces.

END OF SECTION 10 73 00

SECTION 107500 - FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes ground-mounted aluminum flagpoles.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - 1. Wind Loads: 110 mph according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles."
 - 2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.
- C. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Flagpole; a Kearney-National Inc. company.
 - 2. Concord Industries, Inc.
 - 3. Eder Flag Manufacturing Company, Inc.
 - 4. U.S. Flag & Flagpole Supply, LP.
 - 5. USS Manufacturing Inc.

2.2 FLAGPOLES

- A. Exposed Height: 35 feet.
- B. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).
- C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.
- D. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.
- E. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter 6". Fabricate from 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.
- F. Internal Halyard, Cam Cleat System: 5/16-inch- (8-mm-) diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
- G. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

2.3 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- B. Sand: ASTM C 33, fine aggregate.
- C. Elastomeric Joint Sealant: Joint sealant complying with requirements in Division 07 Section "Joint Sealants."

2.4 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

- B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Install flagpole, plumb, in foundation tube. Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
- D. Mounting Brackets and Bases: Anchor brackets and bases securely through to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 107500

SECTION 11 31 30 – DUPLEX GRINDER PUMP STATION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall provide all labor, materials, equipment and incidentals required to design, manufacture, and install, complete and ready for operation a duplex submersible grinder pump station with fiberglass wet well as shown on the Drawings and as specified herein.
- B. Equipment shall be new, unused, suitable for intended usage, and installed in complete conformance with the manufacturer's instructions. The pump station shall be outfitted with duplex submersible wastewater grinder pumps fitted with new stainless steel guide rail assemblies, stainless steel lifting chains, stainless steel support brackets, base elbows, and power cables and controls.

1.2 SUBMITTALS

- C. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with the provisions of the General Conditions. Submittal shall include at least the following:
 - 1. Dimensions of all components.
 - 2. Complete installation instructions.
 - 3. Pump Data Sheets including performance curves.
 - 4. Complete description of materials and resins used, including physical properties and methods of manufacture for the fiberglass wet well.
 - 5. Certification that materials of fiberglass reinforced polyester are resistant to chemical attack from untreated sewage and related chemicals including but not limited to hydrogen sulfide and dilute sulfuric acid.
 - 6. Statement that fabrication is in accordance with this Section.
 - 7. Complete bill of materials.
 - 8. Complete assembly drawings.

1.3 QUALIFICATIONS

- D. The pumps covered by these Specifications are intended to be standard pumping

equipment of proven ability as manufactured by a manufacturer having a minimum of five (5) years experience in the production of such pumps. The pumps furnished shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards.

- E. Sufficient copies of an operating and maintenance manual for each pump shall be furnished to the Engineer. The manuals shall include all required cuts, drawings, equipment lists, descriptions, and other material required to instruct operating and maintenance personnel unfamiliar with such equipment.

PART 2 - PRODUCTS

2.1 FIBERGLASS WET WELL

- A. The wet well structure shall be a one-piece unit of fiberglass reinforced polyester plastic with uniform, smooth surfaces. All surfaces shall be smooth, resin rich, free of voids and porosity, without dry spots, crazes, delamination, pits, blisters, or unreinforced areas and shall provide for increased corrosion resistance and weathering.
- B. Resins shall be commercial grade unsaturated polyester resin. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with domestic wastewater collection systems.
- C. The reinforcing materials shall be commercial Grade "E" type glass in the form of mat, continuous roving, chopped roving, roving fabric or a combination of the above, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin. If reinforcing materials are used on the interior surface of the wet well, it shall be a commercial grade chemical-resistant glass that will provide a suitable bond with the resin and leave a resin rich surface.
- D. The laminate shall contain ultra-violet inhibitors added to protect the laminate from deterioration from sunlight. The laminate shall contain a glass content of 54 plus/minus 2 percent using Type "E" glass with chrome or silane finish. Final laminate thickness shall be within plus/minus 10 percent of the nominal required thickness.
- E. The manufacturer shall maintain a continuous quality control program and the Contractor shall furnish the Engineer with certified test reports consisting of physical tests of samples as described herein and as otherwise required to demonstrate the quality of plastic being furnished.
- F. Tests shall be performed as specified in ASTM D3753. Hardness test shall be made with the resin-rich surface of the product. Flexural tests shall be made with the resin rich surface in compression. Test samples shall be full thickness of the item produced and shall not be machined on the surface.
- G. The complete wet well shall have a minimum dynamic-load rating of 16,000 foot-pounds when tested in accordance with ASTM D3753. To establish this rating, the complete wet well shall not leak, crack, or suffer other damage when load tested to 40,000 foot-pounds

and shall not deflect vertically downward more than $\frac{1}{4}$ inch at the point of load application when loaded to 24,000 pounds.

- H. The wet well cylinder shall have a minimum pipe-stiffness value shown in Table 1 when tested in accordance with ASTM D3753.

Table 1 – Stiffness Requirements	
Length – Feet	F/AY – PSI
10 to 20	2.01
21 to 30	3.02

- I. The wet well shall have the minimum physical strength values shown in Table 2 when tested in accordance with ASTM D3753.

Table 2 – Physical Properties		
Property	Hoop Direction	Axial Direction
Tensile Strength (psi)	18,000	5,000
Tensile Modulus (psi)	0.8×10^6	0.7×10^6
Flexural Strength (psi)	26,000	4,500
Flexural Modulus (psi)	0.7×10^6	0.7×10^6

- J. The wet well shall be clearly marked with the following information: Manufacturer's name or trademark, manufacturer's serial number, ASTM designation, total length, and nominal diameter.
- K. Factory installed piping connections shall be fiberglass layup in accordance with ASTM D3299 specifications.

2.3 WET WELL COVER / ACCESS HATCH

A wet well cover shall be provided with the wet well assembly. The cover shall be $\frac{1}{4}$ " thick aluminum plate with diamond pattern and hinged access hatch. Hinges shall be stainless steel. The cover shall be bolted to the wet well with stainless steel cap screws. Zinc plated nuts shall be embedded in the upper flange of the fiberglass wet well for corrosion resistance and to prevent turning.

2.4 CHECK VALVE

Heavy duty, PVC, flapper-style or ball-check valves shall be used in the pump discharge piping to prevent backflow from the force main. The valves shall be designed to operate at all pressures in the sewer system created by the grinder pumps.

2.5 DISCHARGE PIPING

Schedule 80 PVC discharge piping shall connect to the c-channel rail system discharge fittings and terminate at a 2" discharge flange mounted on the wet well at the height shown in the plans. The discharge flange shall have a 2" NPT hub for attaching external discharge piping.

2.6 SHUTOFF VALVE

PVC true union ball type shut off valves with Teflon seats shall be furnished as an integral part of the internal pipe assembly. If the discharge depth is more than 2 feet from the surface an extension handle shall be supplied.

2.7 INLET FITTING

A one-piece inlet fitting for 4" SDR 35 PVC pipe shall be shipped loose for field installation as required by the installation.

2.8 SUBMERSIBLE GRINDER PUMPS

A. Pump Materials

Impeller	85-5-5-5 Bronze
Shaft	Stainless steel, AISI Type 416
Volute	Cast iron, ASTM A48, Class 30
Cutter / Shredding Ring	Hardened 440C Stainless steel, Rockwell C-55
Bearing Housing	Cast iron, ASTM A48, Class 30
Bearings	Steel, permanently lubricated
Bolts, Nuts	Stainless steel, ASTM A 276, Type 316

B. Accessories

Lifting Chain	Stainless steel, ASTM A 276, Type 316
Guide Rails	Stainless steel, ASTM A 276, Type 304
Brackets	Stainless steel, ASTM A 276, Type 316
Anchor Bolts, Nuts	Stainless steel, ASATM A 276, Type 304

C. Pump Design

1. The pumps shall be totally submersible centrifugal grinder pumps with submersible close coupled motors designed to pump raw, un-screened domestic sewage consisting of water and fibrous materials. The design shall be such that the pumping units shall be automatically connected to the discharged piping when lowered into place on the discharge connection. When the pump is in place, the weight of the pump shall force the discharge flange against the discharge elbow flange providing a leak-proof seal. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose, and need for personnel to enter the pump well. Each pump shall be fitted with a non-sparking lifting hook of adequate strength to permit raising the pump for inspection and removal.

2. Each pump shall be provided with a tandem mechanical seal running in an oil reservoir, composed of two separate lapped face seals, both consisting of one stationary and one rotating ring with each pair of seals held in contact by a separate spring, so that the outside pressure assists spring compression in preventing the seal faces from opening. On the pump side, the rings shall be carbon steel. On the bearing side the faces shall be carbon and silicon carbide. The compression spring shall be protected against exposure to the pumped liquid. The pumped liquid shall be sealed from the oil reservoir by the bottom seal and the oil reservoir from the motor chamber by the top seal. The seals shall require neither maintenance nor adjustment, and shall be easily replaced.
3. The pump shaft shall rotate on permanently lubricated ball bearings properly sized to withstand the axial and radii forces.
4. A sliding guide bracket shall be integral part of the pumping unit and the pump casing shall have a machined connection flange to connect with the cast iron discharge connection elbow, which shall be bolted to the floor of the sump with stainless steel anchor bolts and so designed as to receive the pump connection without the need of any bolts or nuts. The guide system and sliding guide bracket assembly shall be of non-sparking construction. The pumping unit/discharge flange connection assembly shall be of non-sparking construction.
5. Pump motors shall be housed in an air-filled or oil filled watertight casing and shall have Class H insulated windings and leads which shall be moisture resistant. Motors shall be NEMA Design B. Motors shall be Class 1, Group D, Division 1 classification explosion proof. Motor shall be non-overloading for entire range of operation without employing the service factor. Motors shall have a minimum service factor of 1.15. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition. Each motor shall incorporate an ambient temperature compensated overheat sensing device. The protected device shall be wired into the pump controls in such a way that if the device operates, the pump will shut down. The devices shall be self-resetting. The motor cable shall be fixed to the pump using a watertight compression assembly. Pump motor cables shall be suitable for submersible pump applications and shall be properly sealed. Pump performance shall be stable and free from cavitation and noise throughout the entire specified operating range.
6. All mated surfaces shall be machined, fitted with O-rings for watertight sealing.
7. The pumps shall be Barnes or approved equal.
8. Each pump shall be guaranteed to perform at the following conditions:

TABLE 1

PUMP DESIGN DATA

Pump Model Number: Barnes, Or Equal	SGVH

Number Of Pumps	2
Design Capacity Per Pump, Gpm	25.5
Total Dynamic Head, Feet	8
Shutoff Head, Feet	32
Maximum Speed, Rpm	3450
Minimum Motor Size, Horsepower	2
Discharge Size, Inches	1.25

2.9 CONTROLS

Pump station shall be supplied with a 2HP, NEMA 4X fiberglass level control panel with high water alarm light, Hand-Off-Automatic switches, circuit breakers, motor starters, incoming power lugs and terminal strips. The duplex panel shall be designed to operate on 240 volt, single phase, 60 hertz power. Controls shall be operated by four (4) non-mercury float, level control switches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation of pumping equipment shall be in strict accordance with the Manufacturer's instructions.
- B. The Contractor shall submit certification by the equipment manufacturer that their equipment has been satisfactorily installed and ready for operation and that the operating personnel have been adequately instructed in the operation, lubrication, and maintenance of their equipment.
- C. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations. Furnish all anchor bolts, temporary lifting equipment, power, water, labor and all other incidentals required for the proper installation of the pumps.

3.2 TESTING AND ACCEPTANCE

- D. Field testing shall be conducted after the installation of all equipment has been completed. The equipment shall be operated for a sufficient period of time to make all necessary, desirable corrections and adjustments. Each pumping unit and all associated equipment shall be given a field test to determine that operation is satisfactory and in compliance with the Specifications.

END OF SECTION 011313

SECTION 14 24 00 - HYDRAULIC ELEVATOR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hole-less hydraulic passenger elevator.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Division 5 Sections for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Hoist beams.
 - c. Structural-steel shapes for subsills that are part of steel frame.
 - d. Pit ladders.
 - 3. Division 9 Section, for finish flooring in elevator cars.

1.2 REFERENCES

- A. Publications listed below form a part of the specification to the extent referenced. The publications are referred to in the text by basic designation only. Perform work in accordance with the latest revised edition of the referenced codes and standards.
 - 1. Air-Conditioning and Refrigeration Institute (ARI)
 - 2. Applicable Federal and State Code requirements.
 - 3. American Disability Act (ADA) or ADAAG: The ADAAG (Americans with Disabilities Act Architectural Guidelines).
 - 4. American Society for Testing and Materials (ASTM)
 - a. ASTM A 366 Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
 - b. ASTM E 152 - Fire Tests of Door Assemblies
 - 5. American Society of Mechanical Engineers (ASME)
 - a. ASME A17.1 Safety Code for Elevator and Escalators
 - b. ASME A17.2 Inspectors' Manual for Hydraulic Elevators
 - 6. Electrical Testing Laboratories (ETL)
 - 7. Elevator Code: ASME A17.1 2010, Safety Code for Elevators and Escalators.
 - 8. Environmental Protection Agency (EPA)
 - 9. ICBO
 - 10. Institute of Electrical and Electronic Engineers (IEEE)
 - 11. Illuminating Engineering Society of North America (IES)
 - 12. National Electrical Manufacturers' Association (NEMA)
 - a. NEMA LD 3 High Pressure Decorative Laminates
 - 13. National Fire Protection Association (NFPA)
 - a. NFPA 70 National Electrical Code; referred to as NEC.
 - 14. Occupational Safety and Health Act (OSHA)
 - 15. Sheet Metal & Air-conditioning Contractor's National Association (SMACNA)
 - 16. Underwriter's Laboratories (UL)

1.3 PERFORMANCE REQUIREMENTS

- A. General: Elevators shall meet the highest standards of the industry. Elevator Information indicate required performances, controls, capacities, features, and finishes for each elevator and are included in these specifications.
 - 1. Running shall be quiet and free from vibration and swaying. When doors open, they shall remain firmly stopped and shall not "teeter".
 - 2. Cars shall not move side to side during process of opening and closing doors.
 - 3. Elevator control system shall be capable of starting the car without noticeable "roll-back" of hoistway machine sheave, regardless of load condition in car, location of car, or direction of travel.
- B. Regulatory Requirements: Comply with current ASME A17.1/CSA B44 elevator code latest edition.
- C. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- D. Non-Proprietary Elevator System Requirement: The entire elevator system, shall be fully non-proprietary. All aspects of the elevator shall be fully serviceable by another elevator company, without involvement from the original elevator vendor-manufacturer. This includes, but not necessarily limited to, elevator system components, parts, controls, circuit and control boards, including providing access codes in the Operating and Maintenance Manuals. Elevator assemblies shall be able to be maintained and serviced by any elevator maintenance company, without requiring any assistance of any kind from the original installer and manufacturer of the elevator equipment.
- E. Elevator Information: As indicated in Drawings.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Selection: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.

- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer installed. Engage the elevator manufacturer who has completed elevator installations similar in material, design with a minimum of ten (10) years documented experience.
- B. Perform work in accordance with the latest revised edition (as of date of this Project Manual) of the Safety Code for Elevators and Escalators (ASME A17.1 - 2010), the National Electrical Code (NFPA 70 - 2010), and /or such State and Local elevator codes as may be applicable.
- C. Elevator Mechanics: Qualification certificates of experience of Journeyman Elevator mechanics employed to install, supervise, test and maintain the elevator(s). Temporary mechanics, helpers or apprentices with less than 5 years experience will be permitted to work under the direct supervision of a journeyman elevator mechanic.
 1. Proximity to Project Site: The Elevator Contractor/subcontractor to whom this project is awarded must have a full-time elevator repair technician located within a 15 mile radius of the project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging.
- B. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders; sumps in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.
- C. Field verify overhead clearance, pit clearances, overall space in elevator equipment room and construction conditions.
- D. Coordinate and verify that elevator equipment to fit within assigned space.
- E. Coordinate and connect to the building smoke and fire alarm system to elevator.

- F. Coordinate and verify electrical service to elevator, from fused disconnect switches in the equipment room to the elevator controllers and machines.
- G. Coordinate with elevator cab and other finish work.
- H. Clearance around elevator, mechanical and electrical equipment shall comply with applicable provisions of NEC (NFPA 70). Arrange equipment in room so that major equipment components can be removed for repair or replacement without dismantling or removing other equipment in same room. Locate controller near and visible to respective machine equipment.

1.9 WARRANTY AND MAINTENANCE SERVICE

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: 1 year from date of Substantial Completion.
- B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 36 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance during normal working hours.
 - 2. Perform emergency callback service during normal working hours with response time of two hours or less.
 - 3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: ThyssenKrupp Elevator
- B. Approved Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Able Elevators
 - 2. American Crescent Elevator Mfg., Corp.
 - 3. Canton Elevators
 - 4. Fujitec America, Inc.
 - 5. KONE Inc.
 - 6. Minnesota Elevator, Inc.
 - 7. Mowrey Elevator Co.
 - 8. Otis Elevator Co.

9. Schumacher Elevator Co.

C. Source Limitations: Obtain elevators from single manufacturer.

1. Major elevator components, including pump-and-tank units, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

2.3 ELEVATORS

A. General: Standard elevator systems with non-proprietary components, as required for complete system.

1. Materials and equipment shall be new, of the best quality, with same brand or manufacturer for all similar material.

B. Elevator Description:

1. Type: Holeless, twin post elevator.
2. Rated Load: 2500 lbs
3. Rated Speed: 80 ft/min
4. Operation System: Single automatic.
5. Auxiliary Operations:
 - a. Battery-powered lowering.
6. Security Features: Keyswitch operation.
7. Car Enclosures:
 - a. Inside Width: As indicated in Drawings.
 - b. Inside Depth: As indicated in Drawings.
 - c. Inside Height: As indicated in Drawings.
 - d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish with integral car door frames.
 - e. Car Fixtures: Satin stainless steel, No. 4 finish.
 - f. Side and Rear Wall Panels: Textured stainless steel.
 - g. Reveals: Satin stainless steel, No. 4 finish.
 - h. Door Faces (Interior): Textured stainless steel.
 - i. Door Sills: Aluminum, mill finish.
 - j. Ceiling: Luminous ceiling.
 - k. Handrails: 1/2 by 2 inches (13 by 50 mm) rectangular satin stainless steel, No. 4 finish, at sides and rear of car.
 - l. Floor prepared to receive resilient flooring (specified in Section 096500 "Resilient Flooring").
8. Hoistway Entrances:
 - a. Width: As indicated in Drawings.
 - b. Height: As indicated in Drawings. .
 - c. Type: Single-speed center opening.
 - d. Frames: Satin stainless steel, No. 4 finish.

- e. Doors: Textured stainless steel.
- f. Sills: Aluminum, mill finish.
- 9. Hall Fixtures: Satin stainless steel, No. 4 finish.
- 10. Additional Requirements:
 - a. Provide inspection certificate in car, mounted under acrylic cover with frame made from polished stainless steel, No. 8 finish.
 - b. Provide hooks for protective pads and one complete set(s) of full-height protective pads.

2.4 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Pump shall be submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts.
 - 2. Motor shall have variable-voltage, variable-frequency control.
- B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Cylinder units shall be connected with dielectric couplings.
- D. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- F. Car Frame and Platform: Welded steel units.
- G. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

- A. General: Provide non-proprietary microprocessor operation system as required to provide type of operation indicated.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
 - 1. Single-Car Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
 - 2. Flood-Moisture sensor in elevator pit. When flooding is detected, raise elevator to second floor, open doors, and shut down.

- C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
 - 1. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations and hall push-button stations. Key is removable in either position.
 - 2. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

2.7 CAR ENCLOSURES

- A. General: Provide enameled-steel car enclosures to receive removable wall panels, with car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Subfloor: Exterior, C-C Plugged grade plywood, not less than 7/8-inch (22.2-mm) nominal thickness.
 - 2. Floor Finish: Resilient floor tile, specified in Division 9 Section; color as selected by Architect from manufacturer's full range.
 - 3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - 4. Fabricate car with recesses and cutouts for signal equipment.
 - 5. Fabricate car door frame integrally with front wall of car.
 - 6. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - 7. Sight Guards: Provide sight guards on car doors.
 - 8. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
 - 9. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - 10. Handrails: Stainless steel; manufacturer's standard shape and finish indicated.

2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
 - 1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 1-1/2 hours.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 - 1. Stainless-Steel Frames: Formed from stainless-steel sheet.
 - 2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - 3. Sight Guards: Provide sight guards on doors matching door edges.
 - 4. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
 - 5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs.
 - 1. Stainless steel buttons, with LED illuminated aperture in middle.
- B. Car-Control Stations: Provide manufacturer's standard recessed or semi-recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
 - 1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
 - 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is stopping at each of the floors. Include travel direction arrows if not provided in car-control station.
- D. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 - 1. Provide units with flat stainless steel faceplate for mounting with body of unit recessed in wall.
 - 2. Equip units with buttons for calling elevator and for indicating applicable direction of travel.
- E. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide:
 - 1. Units mounted in both jambs of entrance frame.
- F. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - 1. At manufacturer's option, audible signals may be placed on cars.

- G. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above each hoistway entrance at ground floor. Provide units with flat faceplate for mounting and with body of unit recessed in wall.
- H. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 MISCELLANEOUS MATERIALS

- A. Faceplates: ASTM A 240, Type 304, stainless steel, brushed or satin finish.
 - 1. Fabricate faceplates for elevator operating and signal devices from not less than 1/8 inch thick flat metal plates, with all edges beveled at least 15 degrees. Install faceplates flush with surface upon which they are mounted.
 - 2. Fasten car and corridor operating devices and signal devices face plates with stainless steel screws.
 - 3. Design car and corridor push-button faceplates so that pressure on push buttons shall be independent of pressure on push button contacts.
- B. Inserts, anchors, bearing plates, beams, brackets, supports, and bracing including templates and diagrams.
- C. Anchorage devices and other components of elevator work where installation of devices is indicated or required.
- D. Sheet metal and angle-iron guards at openings in the machine room floor to protect personnel from accidental contact with the ropes.

2.11 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- C. Textured Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 with embossed texture rolled into exposed surface.
 - 1. Metal surface is satin polished after texturing.
- D. Stainless-Steel Bars: ASTM A 276, Type 304.
- E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Make corrections to unsatisfactory conditions.

3.2 INSTALLATION

- A. General: Install in accordance with ANSI/ASME A17.1.
 - 1. Install components and connect equipment to building utilities.
 - 2. Arrange components in equipment room so equipment can be removed for repairs or replaced without dismantling or removing other equipment components.
 - 3. Coordinate installation of hoistway wall construction.
 - 4. Set entrances in vertical alignment with car openings, and aligned with plumb hoistway lines.
 - 5. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
 - 6. Seal new ducts, conduits and piping penetrating walls and ceilings with fire-rated sealant.
 - 7. Provide escutcheons for conduits and piping penetrating exposed walls.
- B. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
- C. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
- D. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- E. Install piping above the floor, where possible. Install underground piping in casing.
- F. Lubricate operating parts of systems as recommended by manufacturers.
- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- H. Leveling Tolerance: 1/4 inch (6 mm), up or down, regardless of load and travel direction.

- I. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- J. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 1. Locate hall push-button stations beside elevator, at location most convenient for approaching passengers.
 2. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
- C. Re-testing:
 1. If any equipment is found to be damaged or defective, or if the performance of the elevator does not conform to the requirements of the contract or the Elevator Safety Code, no certificate of approval shall be issued, until defects have been corrected.
 2. After non-conforming items, parts, test failures, defects, repairs and adjustments have been completed and the discrepancies corrected, re-inspected at verify that the elevator(s) is in proper operating condition.
 3. Do not use a rejected elevator until it has been re-inspected and approved.
- D. Certification: Perform and furnish certification for the tests required by A17.1 – 8.10.2. Certification must state that each car safety device has been tested and approved.
- E. Test Report Records: Provide on-site records of inspection and test performed. Include in Maintenance and Operating Manuals.

3.4 PROTECTION

- A. Temporary Use: Comply with the following requirements for elevator used during construction:
 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 2. Provide strippable protective film on entrance and car doors and frames.
 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 5. Do not load elevators beyond their rated weight capacity.
 6. Provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

7. Restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator.
- B. Check operation of elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142400

SECTION 211300 - FIRE SUPPRESSION SYSTEM

PART 1 – GENERAL

1.1 SUMMARY

- A. Work under this Section shall include all labor, material, equipment, transportation, services and facilities necessary to complete the interior Fire Protection System for the building as shown on drawings and as specified herein without exception.
- B. Applicable provisions of GENERAL AND SUPPLEMENTARY CONDITIONS shall apply to this Section as if written in full herein.
- C. The work shall include but is not necessarily limited to the following:
 - 1. Wet pipe sprinkler system for the building, in accordance with latest revisions of NFPA fire codes.
 - 2. Fire suppression system for the kitchen hood.
 - 3. Work under this section shall include all labor, materials, engineering, transportation, insurance, taxes and permits required for the complete installation of a wet pipe automatic fire protection system. All work to be in accordance with the requirements of the authority having jurisdiction.
- D. Painting, unless otherwise specified is not included under this Section.

1.2 CODES AND STANDARDS

- A. Final systems design, materials, workmanship and testing shall conform to the following Codes and Standards, when same have jurisdiction.
 - 1. N.F.P.A. 13, 101, 24, 72, 96 and all applicable Codes.
 - 2. Property Insurance Association of Louisiana.
 - 3. State of Louisiana Fire Marshal.

1.3 QUALIFICATIONS OF FIRE PROTECTION CONTRACTOR

Contractor must be licensed in the State of Louisiana to perform sprinkler work, and must be regularly engaged in making such installation.

1.4 SHOP DRAWINGS AND DATA SHEETS

- A. Contractor to provide Architect with shop drawings and calculations including flow and hydrant tests for Owner's approval prior to commencement of work. Comply with Division 1 Sections' submittal requirements. Work is not to be started until: 1) shop drawings have been corrected to conform to Owner's approval, 2) copies of corrected drawings shall be submitted to the Architect and State Fire Marshall, and 3) drawings have been returned from the State Fire Marshall with review comments. Contractor shall submit Owner's stamped approved drawings to the State Fire Marshall for his review. This Contractor shall pay for all review fees required by the State Fire Marshall.

- B. The Contractor shall provide written verification as part of the State Fire Marshal submittal package stating that the proposed location of the fire department connection, the outlet diameters, fitting type and thread type comply with the requirements of the local fire department.

1.5 AS-BUILT DRAWINGS

- A. Contractor shall maintain a set of drawings showing exact locations and sizes of all piping, valves and related items, which shall be corrected daily and shown every change from original contract drawings and specifications.
- B. On completion of the work, Contractor shall provide a set of reproducible transparencies corrected to show all changes noted on "As-Build" Drawings, together with two (2) sets of Blue Prints, to the Architect for delivery to the Owner. The corrected transparencies shall bear the approval of the Underwriters, and Property Insurance Association of Louisiana. Refer to Division 1 Sections for record documents procedures.

1.6 CUTTING AND PATCHING

- A. Contractor to provide all opening for proper installation of the work specified, in foundations, walls, floors, ceilings, partitions, stairways, etc., and do all patching and repairing required, except where otherwise noted on drawings.
- B. Cutting structural members for the passageway of sprinkler piping or for pipe hanger fastenings will NOT be permitted.
- C. Holes through walls, floors, and ceilings shall be large enough to accommodate pipe expansion. Suitable plates shall be provided at each hole to insure the effectiveness of the floor or wall as a fire stop.

1.7 INTERFERENCE

The Sprinkler Contractor shall coordinate with other trades so that interference between piping, conduit, ductwork, equipment, apparatus, architectural and structural work will be avoided. In case of interference developing, the Architect or his authorized representative shall decide which equipment, piping, ductwork, etc., must be relocated, regardless of which was first installed.

1.8 TAXES

Contractor shall include all taxes required.

1.9 PERMITS, FEES AND INSPECTION

This Contractor shall obtain and pay for all permits and shall pay all fees required in connection with this work, not covered by permits obtained by General Contractor.

1.10 CERTIFICATE OF APPROVAL

Upon completion of all work, this Contractor shall furnish the Owner a certificate of approval from such authorities as may have jurisdiction.

1.11 CLEANING UP

This Contractor shall at all times during construction keep the premises free from waste materials, or rubbish caused by his employees or work and at completion shall remove all surplus materials leaving the building in a clean swept condition.

PART 2 - PRODUCTS AND INSTALLATION

2.1 WATER CONNECTION

Connection to the city water main for the water supply to the fire protection systems shall be provided under this Contract. This Contractor shall make all arrangements and pay all costs for this connection. All work shall be in compliance with NFPA – 24.

2.2 MAIN CONTROL VALVE

O.S. & Y gate valve to be installed on the main riser. Provide contactor on valve compatible with fire alarm system to indicate when valve is closed, connection to fire alarm system shall be by fire alarm contractor.

2.3 MAIN DRAIN

Main drain valve and piping to properly drain each system shall be located at each system riser and piped to open air outside the building.

2.4 PIPE AND FITTINGS

- A. All interior pipe shall be ASTM A135 Schedule 40 black steel pipe with malleable iron screw fittings or cut groove fittings similar to Victaulic, Grinnell, or equal, as required. Fittings shall be ASME B16.3 Class 300 standard pattern with threads according to ASME B1.20.1. Provide all required pipe supports under building and above ground in accordance with National Fire Codes.
- B. All piping shall be manufactured in the United States of America.
- C. Underground piping shall be class 150, cement lined and exterior coated, ductile iron water pipe with mechanical joints. At Contractor's option, 6' outside of the building may be PVC C900, class 150 water pipe with mechanical joint fittings with a minimum pressure of 250 PSI.
- D. All piping and fittings shall be rated for the hydraulic pressure encountered throughout the system.

2.5 SPRINKLERS

- A. Sprinkler heads in unfinished ceiling areas to be brass upright.

- B. Sprinkler heads in finished areas shall be concealed type heads with white cover.
- C. All heads in acoustical tile areas shall be centered in the tile, both ways.
- D. Contractor shall include, in his bid, any and all heads required to meet all applicable sections of NFPA 13, weather indicated on the drawings or not.
- E. It is the intent of this section that the contractor provide a complete and operational system that shall meet all codes and that all costs shall be included in this bid price.
- F. All heads to be quick response type.
- G. Provide (10) ten additional brass upright and (10) ten additional concealed heads to be installed as directed by the Engineer. Include approximately 25 feet of piping and necessary fittings for each head.

2.6 SPRINKLER SYSTEMS

- A. Wet pipe sprinkler systems shall be provided to all areas of the building. These systems shall be designed for a Light Hazard Occupancy, except as defined below.
- B. All equipment rooms, storage rooms, mechanical rooms and electrical rooms shall be provided with a sprinkler system designed for ordinary hazard group 1 occupancy.
- C. Provide ground level fire department Siamese connection where shown on the drawings. Connections shall be Potter-Romer Series 5100 or Elkhart Brass Company 163, chrome plated, flush type fitted with chained caps. Threads shall match Fire Department requirements. Connect Siamese to fire protection system.

2.7 VALVES

- A. All valves used in the fire protection system shall be UL listed and FM approved with 175 psig non shock minimum working pressure rating.
- B. Gate valves, 2 inches and smaller shall be UL 262 cast bronze, threaded ends, solid wedge, outside screw and yoke, rising stem.
- A. Gate valves 2-1/2" and larger shall be 262, iron body bronze mounted, taper wedge, outside screw and yoke, rising stem.
- B. Swing check valves, 2-1/2" and larger shall be UL 312, cast-iron body and bolted cap with bronze or cast iron disc with bronze disc ring.

2.8 GENERAL CONSTRUCTION WORK

Provide all openings for proper installation of work specified, in walls, ceilings, and floors and do all patching of same as required.

2.9 ENGINEERING

Prior to installation of any work, this Contractor is to prepare installation and fabrication drawings and have same approved by the insurance authority having jurisdiction and Owner's representative.

2.10 INSURANCE

This Contractor is to furnish certificates of insurance prior to commencing work.

2.11 PERMITS

This Contractor is to pay for all permits required for this portion of the work.

2.12 HYDROSTATIC TEST

This Contractor is to hydrostatically test the entire interior system to 200 PSI for a period of two (2) hours in accordance with NFPA 13, and show evidence that he has had an authorized representative of the Owner present for the test.

2.13 WARRANTY

This Contractor is to warrant all material and workmanship, free from defects, for a period of one (1) year from date of acceptance of installation.

2.14 WATER FLOW SWITCH

Provide one water flow switch (1) Grinnell Model VSR-D or Potter Model VSRF on the supply pipe to the sprinkler systems of the building, make compatible with fire alarm system, connection shall be by fire alarm contractor.

2.15 CODE COMPLIANCE

- A. The Contractor shall flush all piping as required by NFPA – 13 and 24. Flow rates for flushing shall be as required by these codes.
- B. Thrust blocks and underground supports shall be provided as required by NFPA-24.
- C. All signage including Siamese connection shall be provided in accordance with NFPA – 13 and 24.
- D. All test certificates in NFPA 13 and 24 shall be completed by Contractor and submitted as part of review process.
- E. Contractor shall review reflected ceiling, mechanical, fire protection and electrical plans and include all heads as required by NFPA-13 for complete sprinkler coverage including coverage around obstructions such as ductwork, piping and ceiling features.

END OF SECTION 211300

SECTION 220500 - VALVES, STRAINERS, UNIONS AND FITTINGS

PART 1 – GENERAL

1.1 SUMMARY

The work under this heading includes the furnishing and installing of all required appurtenances incidental to the piping systems as indicated on the drawings. Refer to BASIC MATERIALS AND METHODS SECTION which shall apply to all work in this Section.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide factory-fabricated valves for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is installer's option. Valves shall be of same make for all these services.
- B. Valves shall comply with the following:
 - Gate - cast iron - MSS SP-70
 - Gate - bronze - MSS SP-80
 - Globe - cast iron -MSS SP-85
 - Globe - bronze - MSS SP-80
 - Ball - MSS SP-110
 - Butterfly - MSS SP-67
 - Check - cast iron - MSS SP-71
 - Check - bronze - MSS SP-80
- C. Gate valves shall be equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Valves shall be designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower. Guides for disc on rising stem valves shall be machined for accurate fit.
- D. Globe valves shall be equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable.) Globe valves shall be designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower.
- E. Ball valves shall have FULL port opening blow out proof stem: hard chrome plated forged brass ball, rated not less than 600# W.O.G. for sizes 3" or smaller.
- F. Provide gear operators on butterfly valves 8" and larger. Valve bodies shall have extended necks to provide for 2-1/4" insulation.
- G. Provide valves with features indicated and where not otherwise indicated, provide proper valve features as outlined in this specification. Comply with ANSI B31.1.

- H. Valve flanges shall comply to ANSI B16.1 (cast iron), ANSI B16.5(steel), ANSI B16.24 (bronze). Steel flanges shall be Class 150.
- I. Threaded valve ends shall comply with ANSI B2.1.
- J. Butt-Weld valve ends shall comply with ANSI B16.25.
- K. Solder Joint valve ends shall comply with ANSI B16.18.
- L. Flangeless valve bodies shall be manufactured to fit between flanges and shall comply with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).
- M. Fabricate pressure-containing components of valves, including stems and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing that resist de-zincification.
- N. Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.
- O. Butterfly valves shall be designed for flow regulation, and manufactured to be tight in closed position. Test pressures in accordance with MSS SP-67 as follows: Seat 2-12" 220psi. No leakage shall be permitted under test.

2.2 GATE VALVE FOR COPPER PIPING (SERVICES UNDER 200 DEGREES F)

- A. Flanged Ends 2-1/2" and Larger: Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Provide dielectric gasket and bolt isolators.
- B. Solder Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge. (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems.)

2.3 BALL VALVES (SERVICES UNDER 200 DEGREES F)

- A. Threaded Ends 3" and Smaller: 600# W.O.G., forged brass two piece body, hard chrome plated forged brass ball, blow-out proof stem.
- B. Soldered Ends 2" and Smaller: 600# W.O.G., forged brass two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem.
- C. Flanged Ends 2-1/2" and larger: Class 150, flanged ends, carbon steel body with 316 s.s. trim, uni-body design, full port, blowout proof s.s. stem and ball, teflon seat.

2.4 SWING CHECK VALVE IN COPPER PIPING (SERVICES UNDER 200 DEGREES F)

- A. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, "Y" pattern swing, bronze disc.
- B. Flanged Ends 2-1/2" and Larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc. Provide dielectric gasket with insulated bolts.

2.5 UNIONS IN COPPER LINES (SERVICES UNDER 200 DEGREES F)

Cast Bronze Unions.

2.6 UNIONS IN BLACK STEEL, WROUGHT IRON OR GALVANIZED STEEL PIPING

Ground joint malleable iron galvanized Class 300 for 2" nominal pipe sizes or below. For pipe sizes 2-1/2" and larger use forged steel welding flanges (Galvanized for galvanized piping).

2.7 UNIONS IN CONNECTION BETWEEN COPPER AND STEEL OR IRON PIPING (SERVICES UNDER 200 DEGREES F)

Provide bronze valves or dielectric waterways.

2.8 LUBRICATED PARALLEL PLUG VALVES

- A. Lubricated parallel plug valves shall be installed at all locations shown on the drawings for gas valves and shall be the same sizes as the entering pipe. Valves shall have a pressure rating of 125 PSI at 450 degrees F and 200 PSI from -20 degrees F to 150 degrees F.
- B. Valves shall be of the lubricated parallel (cylindrical) plug type with clearance between plug and body sealing surfaces equal to, or less than .002 inch. The body, plug and bottom cover shall be cast iron (ASTM A126 C1B).
- C. Valves shall be flanged with face to face dimensions in accordance with ANSI B16.10 short pattern.
- D. The plug shall have a rectangular port, reduced bore, having a flow area equal to, or greater than, 60% of the same size of the pipe. The body/plug juncture shall have a reinforced TFE thrust washer to minimize operating torque. The valve body shall have a surface penetrating hot phosphate protective treatment.
- E. The valve lubricating systems shall have a lubricating screw with buttonhead fitting, and a tight sealing lubricated check valve in the valve stem, and shall be so constructed as to ensure complete lubrication of all sealing surfaces. Lubricant extruding around the valve stem shall indicate that the system is filled to capacity. The sealing compound shall have a temperature ranging from -20 degrees F to 400 degrees F.
- F. Valves shall be Milliken Model 171M or Homestead Model 612, or approved equal.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND INCIDENTAL ITEMS

- A. All valves shall be installed so as to be easily accessible for cleaning, inspection, maintenance, and operation.
- B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Provide chain operators on all valves over 6' above floor in mechanical rooms.

- C. Except as otherwise indicated, install valves with the following ends or types of pipe/tube connections:
 - Tube Size 2" and smaller - Soldered-joint valves
 - Pipe Size 2" and smaller - Threaded valves
 - Pipe Size 2-1/2" and larger - Flanged end valves
- D. Install swing check valves in horizontal position, unless otherwise shown on drawings, with hinge pin horizontally perpendicular to centerline of pipe. Install for proper direction of flow.
- E. Provide access panels at all concealed valves.
- F. Major control and sectionalizing valves throughout building shall be identified by means of a brass valve tag bracketed to valve handle. Contractor shall prepare schedule of such identifying plates and frame under glass for installation in main equipment room.
- G. All welded piping to be welded by certified welders skilled in the work to be done.
- H. No piping of dissimilar metals placed in contact or in close proximity with each other. Provide bronze valves wherever piping of dissimilar metals is joined.
- I. Run all piping concealed unless specifically noted otherwise, making all necessary offsets, turns, etc., necessary to conceal piping from view.
- J. Provide all necessary steel frame supports, anchor bolts, sleeves, etc., required for safe support of equipment and piping installed under this contract. The Mechanical Contractor shall be completely responsible for the accurate position and dimensions of all foundations and support items.

END OF SECTION 220500

SECTION 220700 - PIPING AND EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide a complete system of insulation, as herein specified, for both inside and outside of building.
- B. The General Provisions of the Contract including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.
- C. Refer to Section BASIC MATERIALS AND METHODS, which is applicable to this Section.
- D. Insulation shall include insulating materials, their applications, finish, bands, tie wire and weather protection for all piping, fittings, valves, and equipment as indicated and specified herein.

1.2 GENERAL

- A. All insulation shall be applied in a workmanlike manner by skilled workmen regularly engaged in this type of work.
- B. All pipe insulation shall have COMPOSITE flame and smoke hazard ratings as tested in accordance with standard testing methods (NFPA) 255 and UL 723).
- C. Composite ratings shall not exceed: flame spread 25, smoke developed 50.
- D. Accessories such as adhesive, mastic, cement, tapes and cloth shall have the same component ratings as listed above.
- E. THE INSULATION CONTRACTOR SHALL CERTIFY IN WRITING, PRIOR TO INSTALLATION, THAT ALL PRODUCTS TO BE USED WILL MEET THE ABOVE CRITERIA.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING ABOVE GROUND

- A. Insulate all new above ground hot & cold water pipe with glass fiber pipe insulation with factory applied white all service jacket, with self-sealing lap (ASJ-SSL).
- B. Insulate fittings, flanges and valves with performed insulation with PVC premolded one-piece fitting covers, with fiberglass inserts. Premolded or shop fabricated Glass Fiber covers may be used in lieu of above at the Contractor's option. Optional covers to be given a smoothing coat of finishing cement in exposed areas and vapor sealed in all areas with vapor barrier mastic coating reinforced with white glass fabric.
- C. Insulation thickness for all cold water piping to be ½ inch.

- D. All new domestic hot water and hot water circulating piping shall be insulated in accordance with the Schedule below.

	PIPE DIAMETER	INSULATION THICKNESS
All mains, branches and other piping	1-1/4" and less 1-1/2" to 4"	1/2" 1"

- E. Provide an isolating vapor seal between pipe insulation jacket and pipe at butt joints of insulation at fittings, flanges, valves, hangers and at 21 foot intervals on continuous runs.
- F. Adhere longitudinal laps and butt strips of jacket with factory applied pressure sensitive tape system.

2.2 DUCT INSULATION

- A. DUCT SIZES SHOWN ON DRAWINGS ARE FREE AREA SIZES. See Section 233000 for insulation and duct material and type required for each application. Insulation shall be as per the following:
- C. Lined Duct system - All lined ducts shall be lined with Knauf Duct Liner E-M, Manville Lina-Coustic ductliner, or approved equal. Duct Lining shall be applied in strict accordance with the latest edition of SMACNA's "HVAC Duct Construction Standard Metal & Flexible." Mechanical fasteners shall meet "Standards for Mechanical Fasteners MF-1-1975." Length of mechanical fasteners shall not compress the insulation more than 1/8" and shall be installed perpendicular to the duct surface. Adhesive shall conform to ASTM C 916 and be applied to the sheet metal with a 90% minimum coverage. All exposed edges of the duct liner material shall be coated with the same adhesive. All rips and tears shall also be repaired using adhesive. All internal duct areas shall be covered with duct liner. Transverse joints shall be firmly butted with no gaps, and coated with adhesive. Longitudinal corner joints shall be overlapped and compressed. For velocities from 4001 to 6000 FPM, metal nosing shall be applied to all upstream transverse edges to additionally secure the insulation." Liner shall be 1" thick, 1.5 PCF.

Exterior Duct Wrap - Exterior insulation duct wrap shall be 2" thick .75 PCF fiberglass wrap with F.S.K. jacket, KNAUF duct wrap, or approved equal.

Exposed ductwork shall be internally lined as specified above and provide with external outdoor duct insulation. Outdoor duct insulation shall be two layer aluminum foil bonded to polyethylene with two inner layers of insulating bubbles. The nominal thickness shall be 5/16" and the insulation shall have a 97% reflectance. Insulation shall be Reflectix Outdoor Duct Insulation or equal.

2.3 AIR CONDITIONING DRAINS AND REFRIGERANT PIPING

- A. Insulate all air conditioning condensate drains and refrigerant pipe, fittings, flanges and valves with flexible foamed plastic tubing insulation, J-M Aerotube 11, Rubatex, or approved equal. Thickness to be 3/4 inch.
- B. Insulate all horizontal waste piping (new or existing) above ground that receives A/C condensate from drain to vertical stack. Also insulate the "P" trap of those drains. Insulation shall be same as specified for above ground domestic cold water piping, fitting flanges and valves except thickness shall be 1/2 inch for all pipe sizes.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND INSTALLATION

- A. All insulation shall be applied per manufacturer's specifications and installation requirements.
- B. Insulation shall be applied over clean dry surfaces after all test have been performed and approved.
- C. Methods of application and other details not specified herein shall be in accordance with manufacturer's recommendations, which shall constitute minimum standards.
- D. Sheet Metal Saddles - 10" long shall be provided on all hangers supporting insulated lines. They shall be fabricated to conform with the outside diameter of the pipe covering and shall be fabricated from 22 gauge sheet iron for pipe through 2-1/2" 20 gauge sheet iron for pipes through 8" and 16 gauge for all pipes over 8".
- E. A rigid insulation material shall be used at each pipe hanger as an insert and the pipe covering shall pass full thickness through the hangers.
- F. On all outdoor piping insulation above ground (including covered parking area), provide aluminum jacket 0.016 inch thick with longitudinal z-joint secured with preformed 2" wide butt strips, as manufactured by KNAUF, MANVILLE or approved equal. Provide preformed aluminum fitting cover on all fittings.

END OF SECTION 220700

SECTION 221100 - PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

- A. Furnish and install new fixtures, waste, vent, cold water and hot water piping shown on plans.
- B. Connections of all equipment and fixtures with accessory fittings, shut-off valves, trimmings, traps, structural supports, insulation, etc., as herein specified and/or as shown on drawings.
- C. Refer to SECTION 230500 which is applicable to this Section.
- D. Include (but not necessarily limited to) the following items of mechanical equipment, fixtures and materials installed and in a first class operating condition:
 - 1. All labor, materials, equipment, accessories, and miscellaneous items required to provide a complete plumbing system. Provide adequate supervision at all times during the progress of the work.
 - 2. All plumbing piping and hangers for same as specified herein and where shown on the Architectural and/or mechanical drawings.
 - 3. All sewer, waste and vent piping and all cleanouts necessary for a complete operation installation as shown on mechanical drawings, or as required by the State and Local Sanitary Codes.
 - 4. Temporary water, sanitary, etc., facilities during construction period.
 - 5. Gas piping including new meter.
 - 6. New water and sewer service including water meter and necessary backflow preventers.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Provide plumbing fixtures and accessories for work in this Section produced, meeting the requirements specified.
- B. Soldering processes shall conform to ASME B31.3 Process Piping and Copper Development Association recommended practices.

PART 2 - PRODUCTS

2.1 SANITARY SEWER

- A. All soil, waste and vent piping shall be solid core, pressure rated schedule 40 PVC with solvent weld fittings. Pipe and fittings shall conform with ASTM D 2665.
- B. Cleanouts in sanitary lines, both inside and outside at building, PVC with screw plugs.
- C. Cleanout covers located in floors for sewer lines inside of building, with satin brass scoriated tops and covers.

- D. Cleanouts shall be installed in each change of direction of sewer lines where more than a 45 degree angle turn is made. Cleanouts shall be provided within 18" of each sanitary tee.
- E. Cleanouts on exterior underground lines shall be brought to a cast-iron cleanout box, with service marking, 1/2" thick flanged type and loose cover. Provide 12" X 4" thick concrete slab around cover and frame.
- F. Size and distance between cleanouts shall be required by local authorities and/or as indicated on drawings.
- G. All floor drains shall be provided with trap primers and 1/2" trap primer line.

2.2 DOMESTIC WATER

- A. Ball valves shall be provided where indicated on drawings and shall be designed for a minimum water working pressure of not less than one hundred fifty (150) pounds per square inch. Each underground valve shall be protected by a cast-iron valve box with minimum thickness of 3/16 inch. The cover shall have the word "WATER" cast in the metal.
- B. Hot and cold water piping inside the building shall be hard drawn seamless copper tubing, type "L", with wrought copper sweat fittings and lead free solder above grade. No joints shall be allowed under building slab, on piping 1" and smaller, larger pipe sizes shall have joints with lead free solder. Water piping underground shall be Type "K". Piping on exterior of building shall be Type "K". Underground water service shall be C900 PVC Class 150.
- C. All piping, fittings, solder and flux used in conjunction with the potable water systems shall be lead free. The term "lead free" shall be as defined in the Safe Drinking Water Act Amendment of 1986 (P.L. 99-339).

2.3 FIXTURES

- A. Furnish, install and/or connect all plumbing fixtures indicated on drawings or as herein specified. Refer to Mechanical as well as Architectural Drawings for location and number of fixtures required. If any fixtures shown on Architectural Plans but not on Mechanical Plans, or vice versa, these fixtures shall be furnished, installed and connected the same as if indicated on all drawings. See Architectural Drawings for specific fixtures required. Where a specific manufacturer's name and catalog number is used to indicate the type and quality required, it shall be assumed that other manufacturer's products may be used, where they are equal and approved by the Architect as stipulated elsewhere herein.
- B. Each plumbing fixture shall be fitted with all necessary and proper fittings, trim and operating devices and shall be left in perfect operating condition. The finish of all traps, wall escutcheons, and exposed metal work in connection with fixtures, trimmings and operating devices shall be chromium plated.
- C. Before setting any fixtures or rough-in for fixtures, obtain the exact mounting height, as desired, from the Architect.
- D. Equipment shown on drawings to be furnished under other sections shall be roughed-in, installed and connected by this Contractor under this Section. This Contractor shall furnish and install all necessary valves, piping, fittings and waste traps, etc., not provided with said equipment but as required for proper operation and installation. Obtain rough-in dimensions before installing any piping.

E. Plumbing fixtures shall be as follows:

WATER CLOSET (MARK P-1)

Floor mounted; china; elongated rim; top spud; low consumption; handicap use, open front white seat less cover; manual flush valve with screwdriver stop and back flow vacuum breaker.

Fixture – Kohler Model K-4350
Flush Valve – Sloan Regal 111

WATER CLOSET (MARK P-1A)

Floor mounted; china; elongated rim; top spud; low consumption; handicap use, ADA compliant; open front white seat less cover; manual flush valve with screwdriver stop and back flow vacuum breaker.

Fixture – Kohler Model K-4405
Flush Valve – Sloan Regal 111

LAVATORY (MARK P-2)

Countertop; 20-gauge SS; self rimming; mount for handicap use, ADA compliant; grid strainer with 1-1/2" tailpiece; 1-1/2" c.p. "P" trap with offset waste to wall; gooseneck spout with wrist blade handles, 3/8" flexible metal c.p. risers with wheel handle stops; provide all piping from supplies to fixture; insulate waste and water piping under fixture with closed cell insulation.

Fixture – Kohler K-2609
Faucet – Kohler K-2211

LAVATORY (MARK P-2A)

ADA wall hung lavatory with wall hanger, pop-up drain, 1-1/2" c.p. "P" trap, offset waste to wall, 3/8" c.p. flexible metal risers with wheel handle stop. Provide ADA Lav Shield to encapsulate all piping.

Fixture – Kohler K-2305
Faucet – Kohler K-2211

SINK (MARK P-3)

Stainless Steel ADA; two compartment; countertop; self-rimming; 8" deep bowl; 20 ga. type 304 s.s.; 3/8" flexible supplies with wheel handle stops; two stopper strainers; continuous waste; 1-1/2" c.p. "P" trap with waste to wall. Provide dishwasher tailpiece connection.

Fixture – Elkay Model GEGR3321
Faucet – Elkay LK800AT08L2
Continuous Waste – Elkay Model LK-53
Stopper – Elkay Model LK-35

SINK (MARK P-3A)

ADA Single bowl; 304 stainless steel; countertop; self rimming; 18 gauge; 22" X 19" x 8"; faucet deck; conical s.s. basket strainer/stopper with 1-1/2" tailpiece; 1-1/2" c.p. "P" trap with waste to wall; single lever swing spout faucet; 3/8" flexible supplies with wheel handle stops. See plans where offset piping and waste are required.

Fixture – Elkay Model LRAD2219
Faucet – Elkay LK800AT08L2
Stopper – Elkay Model LK-35

SERVICE SINK (MARK P-4)

Molded plastic floor mop sink; 12" high sides; 24" X 24" X 10"; faucet with integral stops; wall brace and vacuum breaker; hose and hose bracket; stainless steel strainer and 3" deep seal "P" trap.

Fixture – Fiat Model MSB3000 2424

Faucet – Fiat Model #830-AA

Hose – Fiat Model #832-AA

SHOWER (MARK P-5)

3'x3' pre-fabricated shower stall. Provide water connections and drain connections.

AquaGlass 613638BC

URINAL (MARK P-6)

Wall hung; china; top spud; low consumption; wall hanger; manual flush valve with vacuum breaker and screwdriver stop.

Fixture – Kohler Model K-4960-ET

Flush Valve – Sloan Regal 186

Carrier – Jay R Smith 0636

URINAL (MARK P-6A)

ADA Wall hung; china; top spud; low consumption; wall hanger; manual flush valve with vacuum breaker and screwdriver stop. Mount at ADA height.

Fixture – Kohler Model K-4960-ET

Flush Valve – Sloan Regal 186

Carrier – Jay R Smith 0636

COMBINATION SAFETY SHOWER & EYE WASH (MARK P-7)

Wheelchair accessible combination eye wash and safety shower with 10" ABS shower head, SS pull rod, push paddle, ABS eye wash receptor and integral eye/face wash assembly. Provide thermostatic mixing valve with SS wall cabinet rated for flow of the shower. Set at 90 degrees F.

Fixture – HAWS8300 with HAWS9201E thermostatic mixing valve

UTILITY SINK (MARK P-8)

Counter mount lay-in large bowl utility sink with gooseneck faucet; faucet deck; conical s.s. basket strainer/stopper with 1-1/2" tailpiece; 1-1/2" c.p. "P" trap with waste to wall; single lever swing spout faucet; 3/8" flexible supplies with wheel handle stops.

DRINKING FOUNTAIN (MARK P-9)

Wall mounted; electric fountain; bi-level ADA compliant with bottle filling station, stainless steel; 120V; 1-1/2" "P" trap; 3/8" c.p. metal supply with wheel handle stop; 7.5 GPH to 50 degree F at 90 degree F ambient.

Fixture – Elkay Model LZSTL8WSSP

HOSE BIBB (MARK HB)

3/4" rough brass, loose key sill cock with vacuum breaker, Smith 5609.QT or Mifab MHY-16. Use for all interior hose bibs.

HOSE BIBB (MARK HB-1)

Wall hydrant J. R. Smith 5509.QT or Mifab MHY-26 cast box with cover, bronze finish, loose key with vacuum breaker. Use for all exterior hose bibs.

FLOOR DRAIN (MARK FD)

J. R. Smith 2005-B, or Mifab F1100C-S, cast-iron - See plans for sizes. Nickel brass square strainers in toilet rooms and finished areas. All floor drains shall have 4" deep seal traps and trap primer connections.

FLOOR DRAIN (MARK FD-1)

J.R. Smith No 2010-F37 or Mifab F1100C-ER cast iron body and flashing collar with extended rim nikaloy strainer, install with rim flush with floor. All floor drains shall have 4" deep seal traps and trap primer connections.

TRAP PRIMER (MARK TP)

Automatic water metering type, Precision Plumbing Products Model PR-500, with SS-8 supply tube and DU distribution unit to serve drains as shown on drawings. Install per manufacturers recommendations and provide wall access panel for periodic inspection. Alternate Manufacturer Mifab Model MI-DU.

WASHING MACHINE BOX (MARK WM)

Metal recessed wall box with hot and cold water hose connections with shutoff valves and drain connection.

ICE MACHINE BOX (MARK IM)

Metal recessed wall box with shutoff valves.

2.4 VALVES, STRAINERS, UNIONS AND FITTINGS

- A. General - All material shall be new, of the best quality with same brand or manufacturer for all similar installations. SEE SECTION 220500 for type and manufacturer.

2.5 WATER HAMMER ARRESTORS

- A. Provide arrestors as marked A.C. (air chambers) where shown on the drawings and/or as necessary to prevent water hammer in the piping based on actual piping arrangement on the job. At a minimum water hammer arrestors shall be provided at each fixture group. Branch lines over 20' shall be provided with 2 water hammer arrestors. Size and install water hammer arrestors as per manufacturer's recommendations for the installed plumbing fixture units on each branch.
- B. Install fluid water hammer arrestors in compliance with ASSE Standard 1010.
- C. Each unit shall be constructed with a single moving part. The barrel shall be fabricated of Type "K" hard drawn copper, with the cap fabricated from standard wrought copper fittings attached to the barrel with lead free solder. The piston shall be machined from brass and equipped with rubber "O" rings.

2.6 GAS PIPING

All gas piping above ground shall be Schedule 40 black steel. Above ground piping system 2" size and larger shall be all welded pipe and fittings. Above ground piping system 1-1/2" size and smaller shall be threaded pipe and fittings using malleable iron fittings. The above ground system shall meet the requirements of ASTM A53. Underground gas piping shall be heat fusion joined

medium density polyethylene, SDR 13.5 yellow color installed with metallic tracer tape. Gas pipe shall be manufactured in accordance with ASTM D2513 with the resin having a D3350 cell classification of 234343E, Grade PE24. Operating pressure shall be 20 PSI. Piping shall be installed in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. All piping, waste and stacks shall be run concealed underground, in ceiling spaces, walls or in chases provided. The entire installation must present an appearance truly in keeping with the best practice and indicative of skill and neatness. In areas of exposed ceilings piping shall be grouped together and run on common pipe hangers with piping run parallel to building lines.
- B. All material shall be installed in a neat and workmanlike manner by competent specialists for each sub-trade. The installation of any materials and equipment not meeting these standards may be condemned by the Architect and shall be removed and re-installed at no additional cost to the Owner. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the Owner.

3.2 INSTALLATION

- A. Pipe shall be laid to the grades and alignment indicated on the drawings. Each pipe shall be laid line to line and grade and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line. The interior of the pipe shall be cleaned of all dirt and superfluous materials of every description. Trenches shall be kept free from water until the pipe joining material has set and pipe shall not be laid when the conditions of the trench or the weather is unsuitable for such work. At times when the work is not in progress, open ends of pipe and fittings shall be securely closed, so that no trench water, earth or other substance will enter the pipe or fittings. Minimum compacted pipe coverage shall be 2'-0", or as indicated on drawings.
- B. Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be run closer horizontally than 6'-0" to water supply main except that the bottom of the water pipe will be at least twelve (12") inches above the top of the sewer pipe, both pipes may be laid in the same trench. Where sewer mains cross above water services the sewer piping for a distance of ten (10') feet each side of the crossing shall be cast-iron without any joint closer horizontally than three (3') feet to the crossing.

3.3 SANITARY SEWER PIPING

- A. New piping shall be a complete system to waste and vent lines from all fixtures.
- B. All waste lines shall be installed on a continuous waste and vent system as required by codes and/or regulations.
- C. All piping shall be installed straight and true and sized as indicated on drawings.

- D. All changes in direction shall be made by the use of 45 degree wyes, double wyes, long sweep quarter bend or 1/8 bends, except that single sanitary tees may be used on vertical stacks. Tees and crosses may be used in vent pipes.
- E. Cleanouts easily accessible shall provide at the foot of each vertical waste or soil stack. Cleanouts shall be of nominal size as the pipes up to four (4") inches and not less than four (4") inches for larger pipes. The distance between cleanouts in horizontal lines shall not exceed those distances required by local authorities, whether indicated or not.
- F. All cleanouts installed so as to be easily accessible, and all outside cleanouts installed flush with finished grade.
- G. Horizontal soil or waste lines shall be run at uniform grade of not less than 1/4" per foot. Horizontal lines shall be supported or anchored at intervals specified in BASIC MATERIALS AND METHODS. All stacks shall be supported at their base and every floor to the roof line and pipes shall be rigidly secured.
- H. Every fixture trap shall be protected against siphonage and back pressure and air circulation assured by means of a soil or waste stack vent, a continuous waste or soil vent, a loop or circuit vent.
- H. No vents shall be less than 2" in diameter and no case shall branch or main vent have a diameter less than half that of the soil or waste pipe served, or as required by local code.
- J. Make all arrangements with Local Authority for the inspection of the installation of the new sanitary sewer system, and pay all costs and assessed fees.

3.4 HOT WATER AND COLD WATER SYSTEMS

- A. This installation comprises a complete and operating system of hot and cold water distribution and connection to each and every fixture and appliance requiring this service and/or as indicated on drawings.
- B. All ends of tubing shall be square cut and burrs removed before assembling. Joints shall be thoroughly cleaned with sandpaper or emery cloth before applying the flux.
- C. All water supply piping, fittings, and fixtures shall be protected against water hammer shock, or surge pressure, by adequate air chambers.
- D. Each riser battery shall be valved in an accessible location.
- E. No hot water piping shall be run closer than six (6") inches from cold water pipes.
- F. Distribution and sizes shall be as indicated on drawings.
- G. Pitch all piping to low points to allow for system drainage.
- H. Make all arrangements with Local Authority for inspection of the new water system and for the building, pay all assessed costs and fees.

3.5 GAS PIPING

- A. Gas distribution system shall consist of a distribution system to each service point as indicated on drawings.

- B. Provide gas cocks shut-off valve and union at each piece of equipment and where indicated on plans.
- C. Connections and piping shall be as shown on plans. Provide drip legs at all low points.
- D. Provide pipe sleeves at all places piping passes through walls. Sleeves shall be such as to provide not less than 1/4" clearance all around gas pipe.
- E. Install all gas lines inside building exposed, no gas piping shall be installed above ceilings. No gas piping shall be installed under building slab. Piping installed through ceiling spaces and floors shall be installed through a galvanized iron, ventilated pipe thimble. All piping shall be installed in accordance with NFPA 54, Standard Gas Code and State of Louisiana Safety Standards for the transportation of natural and other gas by pipeline.
- F. See Section 230500 for testing of gas piping.

3.6 MISCELLANEOUS ITEMS OF WORK

- A. Contractor shall be responsible for securing all information and data for connection to all utilities and pay all costs including meter fees and connection fees.
- B. Contractor shall provide temporary water and sewerage on site for use during construction period as required.
- C. All valves shall be installed so as to be easily accessible for cleaning, inspection maintenance, and operation.
- D. Provide access panels at all concealed valves.
- E. All welded piping to be welded by Certified welders skilled in the work to be done.
- F. No piping of dissimilar metals placed in contact or in close proximity with each other. Provide bronze valves wherever piping of dissimilar metals is jointed.
- G. Provide all necessary steel frames supports, anchor bolts, sleeves, etc., required for safe support of equipment and piping installed under this contract. The Mechanical Contractor shall be completely responsible for the accurate position and dimensions of all foundations and support times.

END OF SECTION 221100

SECTION 230500 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.
- B. Separation of specifications into sections is for convenience only and is not intended to establish limits of work or liability. The following are the Sections that will apply to this project.

230500 - Basic Materials and Methods
220700 - Piping and Equipment Insulation
221100 – Plumbing
211300 – Fire Suppression System
230000 - Heating, Ventilation and Air Conditioning
220500 - Valves, Strainers, Unions and Fittings

1.2 DESCRIPTION OF WORK

- A. The work to be done under this heading includes the furnishing of labor, materials, equipment, and service necessary for and reasonably incidental to the proper completion of all mechanical work as shown on the drawings and herein specified.
- B. Visit and examine the job site, and with all authorities concerned in order to become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed. Pay all costs and fees for utility connections.
- C. Materials and equipment shall be new, except where otherwise indicated, of the best quality, with same brand of manufacturer for all similar material. All equipment shall be installed in accordance with manufacturer's requirements. Equipment with electrical components shall be laboratory tested.
- D. All work shall be performed in a neat and workmanlike manner, and in accordance with all codes, standards, and requirements of the industry. All workers shall be trained in the tasks they perform. Training shall be by an industry accepted trade school.
- E. In general, provide the installation of plumbing, sprinkler system, HVAC systems complete with all pumping, piping, fittings, fixtures, equipment, etc.
- F. Regardless of titles and subdivisions herein employed, consider these specifications as one complete document with General Section applying to all other sections. All bidders are cautioned to read entire specifications and to thoroughly familiarize themselves with all requirements thereof.
- G. Check all specifications and all drawings and bring to attention any conflicts or variations as shown as noted.
- H. Specifications and accompanying drawings apply to all contracts or sub-contracts entered into for supplying material or labor for construction of work specified herein and shown on drawings.

- I. Protect Owner and his agents including Construction Manager, Architect and/or Engineer from any and all damages and expense arising from fulfillment of contract and at completion of work repair all damages done.
- J. For any points which are not clear, or for items and/or details which the Contractor feels are in need of clarification, consult the Architect before submission of a proposal.
- K. The drawings and the specifications are complementary and what is shown and/or called for on one shall be furnished and installed the same as if shown and/or called for in the other.
- L. In case of discrepancies and/or ambiguities in the drawings and/or in the specifications, the Architect shall be consulted prior to submission of a proposal. Failure to do so on the part of the successful bidder shall be construed as explicit agreement on his part to abide by the Architect's decision in such matters.
- M. The word "provide" as used in these Specifications and on the Drawings shall be termed to mean "furnish and install".
- N. Contractor shall include in base bid the connection of all sewer, and water piping to mains as shown on the drawings. Contractor shall include all material and all costs for complete installation, including meter fees and connection fees.
- O. If the Contractor notices during the bidding any items of the contract documents which will violate any applicable code, these items shall be brought to the attention of the Architect before the bid date. Failure to bring these items to the attention of the Architect shall be construed as explicit agreement that the Contractor has included in his bid price any and all modifications necessary to complete the project in accordance with all applicable codes.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. All exposed piping, ductwork and other equipment requiring painting will be painted under PAINTING SECTION. Leave all these surfaces clean of oil, dirt, plaster, etc., ready for painting section's work.
- B. Power wiring for all equipment shall be done under ELECTRICAL SECTION.
- C. Provide approved wiring diagrams to the Electrical Contractor showing interlocking of all equipment and controls, assisting in all wiring problems affecting his equipment, checking and verifying that same is wired correctly under the Electrical Section for proper operating of all mechanical items.
- D. Furnish under this section all heating, air conditioning, ventilating and other mechanical systems controls, starters, firestats, relays, and related equipment.
- E. Openings for all access doors, relief and return air grilles, etc., shall be provided under the respective trade sections.
- F. Curbs, flashings, etc., for exhaust fans, vents, etc., shall be provided under the respective sections.
- G. All HVAC control wiring shall be furnished and installed by Building, Automation and Temperature Control Contractor.

- H. Piping and ductwork penetrations through fire rated partitions/floors shall be fire sealed in accordance with the UL fire resistance directory. See Sealant Specification for materials. The integrity of the fire rating, as indicated on the architectural drawings, shall be maintained.

1.4 QUALITY ASSURANCE

- A. The Contractor bidding on this portion of the work must be fully experienced in installations of equal size, complexity, and quality, and must be licensed to perform such work as required by the Louisiana State Legislature, R.S.37:2152-2163.
- B. In bidding he acknowledges that he fully understands the scope of work and design, and has the ability for the contract price to assemble and install the equipment, piping and ductwork shown or specified, so as to mold same into a satisfactory workable system and arrangement.
- C. Contractor shall recognize that a fault or error in his work remains his responsibility regardless of whether such difficulty was discovered after the work had progressed, and shall make corrections at no cost to the Owner.
- D. Adequate and competent constant supervision shall be provided by Contractor to assure that work is done in accordance with good standard practice and workmanship and with intent of drawings and specifications. Contractor shall recognize that amount of information and detail could be provided to contract documents is limitless and could extend into every minute detail and sequence of operations, to a point where only workmen would be required, without drawing on ability, experience and ingenuity of the Contractor.
- E. All work shall be installed in strict accordance, with all existing local and state codes and ordinances, with National Board of Fire Underwriters
- F. This Contractor shall secure all permits and inspections and shall pay all fees and taxes and shall provide Owner with certificates of approval from agencies having jurisdiction over various phases of work.
- G. Contractor shall maintain and service all equipment until time of acceptance by Owner. Contractor shall include all required service access in the installation as required by the manufacturer and governing codes.
- H. Prior to starting any work, the Contractor shall submit a quality assurance plan for approval by the Architect. In the quality assurance plan, the Contractor shall provide the following information:
 - 1. List of all sub-contractors and equipment suppliers.
 - 2. List of all foreman and job superintendents including job experience for all trades.
 - 3. Construction time schedule demonstrating coordination with other trades and showing detailed time lines for test and balance and commissioning being completed prior to final punch list inspection.

1.5 SUBMITTALS

- A. Shop Drawings and Submittal Data required:
 - 1. Submit to the Architect for review, complete descriptive information and dimensional data on all items of equipment, materials and accessories, including duct, equipment and

sprinkler layouts. Piecemeal submissions shall not be approved. Written approval there of must be obtained before ordering or installation. The following shall be submitted:

Exhaust Fans	Insulation
Plumbing Fixtures	Valves, Strainers, Unions & Fittings
Gas Fired Furnaces	Cooling Coil
Water Heater	DX Split Systems
Packaged Rooftop Units	Air Purification Units
Electric Unit Heaters	Diffusers, Grilles & Registers
Kitchen Hood	Ductwork Shop Drawings

2. Shop drawings and submittal data shall be considered to be instruments of service only and submitted for the sole purpose of convenience to the Contractor to assist him in the performance of the contract. The Architect's review of the shop drawings and submittal data shall not supersede these specifications, the accompanying drawings, or the contract terms, unless specifically covered by a properly executed change order, and then only to the extent specifically and explicitly stipulated therein.
 3. Submit in accordance with requirements of Architectural Sections, Division 1.
 4. Ductwork shop drawings shall be at a minimum $\frac{1}{4}$ " scale. Duct shop drawings shall show the following:
 - a. All structural members larger than 4".
 - b. All hydronic piping 2" or larger.
 - c. All conduit 2" or larger
 - d. All duct fittings, take-offs, volume dampers, control devices and fire dampers.
 - e. All grilles, louvers, registers and diffusers.
 - f. Duct dimensions and insulation methods.
 - g. Duct dimensioned from structural beams and columns.
 - h. Architectural ceiling heights, furrings, chases, etc.
 - i. Cross-sections in areas of congestion or conflict.
 - j. Installation details for all duct and related equipment.
 - k. Lights, speakers, smoke detectors and other ceiling mounted devices.
- B. After completion of project Contractor shall turn over to the Architect complete operating and maintenance instructions including listing of supply and repair items and locations of places to purchase same. Comply with requirements of Division 1 Sections.
- C. Substitutions:
1. All material, equipment, methods, and accessories entering into the work under this section of contract are subject to approval or disapproval of the Owner. Approval of any manufacturer, material, or product shall not constitute a waiver of Owner's right to demand full compliance with contract requirements, including shape, size, quality and performance.
 2. Equality of materials is that established by opinion of Owner. Decision of Owner is final.
 3. Whenever a material or article of equipment is specified by use of a proprietary name, or by naming the manufacturer or vendor, any material or article which will perform adequately the duties imposed by the design will be considered for substitution, providing it is of equal substance, and function, meets specifications, and is aesthetically acceptable to the Owner. Refer to Division 1 Sections for approval procedures.

4. Literature, technical data, etc., includes complete data and samples if necessary, with submissions for substitutions. Burden of proof that material offered for substitution is equal, or superior, in construction and efficiency to that named, rests on Contractor, and unless proof is satisfactory to Architect, substitution will not be approved. Contractor shall note any deviations from specified equipment with the substituted submittal. Failure to note deviations will result in rejection of substituted equipment and materials.

D. See Architectural Specifications for "As-Built" requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the Owner. Comply with equipment manufacturer's requirements. No insulation or electrical components, shall be subject to water damage.

1.7 JOB CONDITIONS

- A. Accompanying drawings, including plans, details, diagrams, notes, etc., are shown to limit and explain structural conditions, construction requirements, sizes, capacities and method of installation and erection. Structural and other conditions may require certain modifications and adjustments from conditions shown. Such deviations are permissible; however, specific sizes capacities and requirements affecting the satisfactory performance and operation of the installation shall remain unchanged. Make allowance for normal job conditions and interferences.
- B. Whenever it becomes necessary to shift ducts or pipes or to change shape of ducts, such changes shall be referred to Architect for approval.
- C. Ask for details whenever uncertain about method of installation. Lack of details not requested shall not excuse improper installation and correction shall be responsibility of Contractor. Contractor shall consult manufacturer for details specific to their items of equipment.
- D. Furnish detailed duct layout and equipment room shop drawings based on field measurements and actual job conditions.
- E. Schedule and perform all mechanical work to avoid delays to the Contractor and other trades.
- F. All piping, cleanouts and covers, and other mechanical items in way of construction or remodeling, shall be rerouted, relocated or otherwise adjusted to work out with such construction or changes shown or specified in any or all of various sections of specifications. Unknown piping that is encountered will be referred immediately to Architect for method of disposition before continuation of work.
- G. The Contractor shall review the architectural drawings to become familiar with the phasing of construction required for this project.

1.8 GUARANTEE AND SERVICE

- A. Guarantee all equipment, materials, and workmanship for a period of one (1) year following date of acceptance.
- B. During the period of guarantee any defects in equipment, materials, or workmanship shall be promptly corrected without cost to the Owner.
- C. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Any deficiencies in equipment capacity specified shall be promptly corrected.
- D. Guarantee does not include maintenance items.

PART 2 - PRODUCTS

2.1 ACCESS PANELS

- A. Provide all access panels necessary for proper access to valves, traps, fixture connections, control devices or other items installed under this contract.
- B. Panels to be Milcor, Type M, or KARP Model D3C-214M hinged with screwdriver lock or as indicated on drawings for special locations, minimum size 12" x 12" or larger as required for proper access.
- C. Exact locations for panels to be directed by Architect.

2.2 TOOLS AND SCAFFOLDING

Furnish all tools, equipment, scaffolding and other facilities required to properly and expeditiously perform the work.

2.3 SIPHON PREVENTORS

Furnish and install on all equipment and fixtures requiring same, backflow preventors or vacuum breakers of a type approved by the Louisiana Health and Human Resources. Water connections to fixtures and equipment shall be made in such a way as to prevent back siphonage when the water supply is out or the pressure drops. Provide reduced pressure type back flow preventors where indicated on drawings. They shall be Watts series 900 or Febco Series 825, size as indicated on drawings. Provide reduced pressure backflow on domestic water and double check valve on fire water.

2.4 SLEEVES AND THIMBLES

- A. Pipe sleeves - wrought iron or cast iron of sufficient size for piping and installation to be installed in floors, walls below grade, and grade beams where piping passes through.
- B. Thimbles above grade - heavy galvanized steel of proper size to allow freedom of piping and insulation, set in floor or roof slab as work progresses, also to be installed in wall and partitions where piping passes through.
- C. Thimbles below grade - same as pipe sleeves above.

- D. Sleeves through floors extend 1" above finished floor. Caulk around and seal all piping in chases and piping passing through floor slab.
- E. Provide sleeve seals and shields for all pipe penetrations of ground floor slab.
- F. Provide UL listed fire-stopping in all pipe penetrations of rated floors and walls, see Architectural Specifications for Requirements.

2.5 BUCKS, GROUNDS AND CHASES

- A. Be responsible for proper location and sizes or for any errors or omission in placing same.
- B. Failure to inform the General Contractor promptly of such requirements shall not relieve the Mechanical installer of the responsibility for providing a complete mechanical system.

2.6 HANGERS

- A. Horizontal piping above grade without hubs shall be rigidly supported. Distance between pipe supports:
 - 1. 1/2" pipe 6'-0" maximum
 - 2. 3/4" pipe 7'-0" maximum
 - 3. 1" pipe 8'-0" maximum
 - 4. 1 1/4" pipe 9'-0" maximum
 - 5. 1 1/2" pipe and over 10'-0" maximum
- B. Hangers shall be similar to "Split Ring" type.
- C. Metal strap or wire will not be acceptable.
- D. For two or more systems of piping run parallel and with same grade trapeze hangers may be used.
- E. Use #22 gauge galvanized sheet steel saddles, minimum 18" long between the pipe covering and each pipe hanger on all insulated lines. Saddles shall extend along pipe runs and at least half way up piping on each side.
- F. All above grade horizontal sewer drain, vent, waste and similar piping shall be hung at every hub using the same type hangers as specified for other piping.
- G. All underground piping under building shall be run in crawl space and shall be supported from slab with S.S. clevis hangers.
- H. Rods supporting pipe hangers shall have the following dimensions:

1/2" to 2" pipe	3/8" rod
2-1/2" to 3" pipe	1/2" rod
4" to 5" pipe	5/8" rod
6" pipe	3/4" rod
8" through 12"	7/8" rod

Rods for trapeze hangers shall be a minimum of 3/8" and shall have the equivalent cross section, listed above, per pipe supported.

2.7 PAINTING AND IDENTIFICATION

- A. Equipment, including pumps, motors, and similar factory fabricated and assembled units shall be furnished with factory applied protective prime coat paint of finished baked enamel. Equipment surfaces damaged during course of construction or shipment shall be refinished by the Mechanical Contractor.
- B. Uncoated black ferrous piping and fittings shall be cleaned under this section and painted with one coat of enamel paint under PAINTING SECTION. Color of piping shall be selected by Architect. Hangers and supports shall be coated by dipping or brush painting with one coat of asphalt varnish. Steel frame equipment supports shall be cleaned and painted with one coat of aluminum paint.
- C. Detached motor controllers, disconnects, etc., shall be identified with metal or plastic plates with etched letters to completely identify service of electrical equipment.
- D. Major control and sectionalizing valves shall be identified by means of etched brass plates bracketed to valve handle. Contractor shall prepare schedule of such identifying plates for Architect's approval.
- E. Exposed ductwork shall be cleaned under this Section and painted under Painting Section.

PART 3 - EXECUTION

3.1 EXCAVATION, TRENCHING AND BACKFILL

- A. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the drawings. During excavation material suitable for backfill shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All material not suitable for backfilling shall be removed completely from job site. Such shoring shall be done as hereinafter specified.
- B. Trenches shall be of necessary width for the proper laying of the pipe and the banks shall be as nearly vertical as practicable. The bottom of the trenches shall be accurately graded to provide uniform bearing and support. Bottom of trenches shall have 6" layer of compacted limestone aggregate. Care shall be taken to provide uniform bearing and support.
- C. Bell holes and depressions for joints shall be dug after compaction and grading in order that the pipe will be supported along its entire length. Whenever wet or otherwise unstable soil that is incapable of receiving the bottom preparation and support piping, as determined by the Engineer, is encountered, such soil shall be removed to the depth required and the trench backfilled to the proper grade with river sand.
- D. All shoring required to perform and protect the excavation, and as required for the safety of employees, shall be installed. The sides of the trenches, four (4') feet or less shall be protected as required. For trenches more than four (4') feet in depth, the sides shall be secured by the use of continuous sheet piling and shall be not less than two (2") inches in thickness. Meet the minimum requirements of OSHA for trench shoring not described above.
- E. The trenches shall not be backfilled until all required pressure tests are performed and until the certificates of inspection from the proper authorities are obtained by the Contractor. The trenches shall be carefully backfilled with the excavated materials approved for backfilling

consisting of earth, loam, sandy clay, sand and gravel, or other approved materials free from large clods of earth or stone, deposited in six (6") inch layers and thoroughly and carefully rammed until the pipe has a cover of not less than two (2') feet. The remainder of the backfill material shall then be thrown into the trench in one (1') foot layers and tamped. Any trench improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted, with the surface restored to the required grade and compaction, mounded over, and smoothed off. Sidewalks, drives and streets broken up by this work shall be repaired and returned to original condition.

3.2 FLASHING AND COUNTERFLASHING

All pipes and ducts that pass through roof and walls shall run so as not to interfere with the structural system and to permit proper application of base and counterflashing. All plumbing vents are to be finished with 2-1/2 pound sheet lead turned down into pipe. Other pipes to be provided with suitable curbs and flashed to roof or walls as indicated. Flues shall be properly flashed and counterflashed with approved type jacks. Roof drains shall have 2-1/2 pound lead sheet base secured to drain clamp and extending minimum of 2'-0" in all directions.

3.3 CLEANING, STERILIZING AND PIPING

- A. When all work has been finally tested, Contractor shall clean all fixtures, pipes and exposed work.
- B. All pipes shall be free from all obstructions.
- C. All plated and other finished products shall be thoroughly cleaned and polished.
- D. New water piping shall be sterilized as required by State Sanitary Code. Provide detailed reports describing sterilization method and duration for each piping section.
- E. All piping shall be installed so that it may expand and contract freely without damages to equipment, other work, or injury to piping system. All necessary swing joints, expansion joints, or offsets to protect piping, etc., shall be installed whether indicated or not. Piping shall be graded to allow for system drainage.
- F. Stainless steel or chromium plated floor, wall and ceiling plates shall be furnished on all exposed piping passing through floor, walls, or ceilings. Plates shall be secured in place with round head screws or toggle bolts of proper size and type for adjacent construction.
- G. All piping shall be installed and sized as indicated on plans and be of equivalent materials to piping as hereinafter specified.
- I. All piping shall be installed with runs arranged parallels or perpendicular to walls and ceilings with symmetrical and equal spacing between parallel pipes. Offsets shall be made using factory fittings, bending of piping shall not be accepted.
- I. Notify Engineer a minimum 72 hours prior to enclosing piping in concealed spaces so that piping may be inspected.

3.4 TESTING AND INSTRUCTION

- A. Piping shall be tested to pressure hereinafter specified. Where pressures are not mentioned, it shall be understood that testing to 1-1/2 times service conditions, before insulation is

applied, will be acceptable. All tests shall be held for a minimum of 24 hours before inspection.

- B. Furnish all necessary gauges, pumps, test plugs, and temporary connections and shall test sections of the building as work progresses.
- C. All new underground sewerage, waste and storm drainage piping shall be plugged at outlets and tested hydrostatically to 10 psi before being covered. Notify Engineer a minimum 72 hours prior to any backfill of underground piping so that piping may be inspected. Failure to notify Engineer prior to backfill will constitute a rejection of the underground piping installation. All other drainage piping, vent and waste risers shall be plugged and tested by filling with water from top to bottom of each floor prior to being connected to fixtures. Tests shall be held a minimum of 24 hours.
- D. All new cold and hot water supply piping shall be tested hydrostatically to 125 pounds per square inch before application of insulation. Test shall be held a minimum of 24 hours.
- E. All new gas piping shall be air tested to a pressure of 75 PSI. During the test, all joints shall be painted with a soap solution to test for leak. The test shall be held a minimum of 24 hours.
- F. All tests shall be made in the presence of the Architect or his representative. Where pipes or connections in new piping are found to leak, they shall be made tight and the tests repeated.
- G. Make all necessary adjustments to controls, dampers, valves, etc., to obtain best operation first with empty building and later under actual conditions. A minimum of two job site visits required.
- H. Thoroughly check the operation of each item of equipment and controls while testing, without waiting first for the Owner or Architect to complain about their operation. Verify that same are wired correctly and completely, notifying the proper parties for necessary corrections. Thoroughly instruct the Owner's representative in the operation and care of controls, individual equipment, and entire system.

3.5 CUTTING AND PATCHING

Cooperate to the fullest extent with all other trades to reduce to a minimum the amount of cutting and patching of other work necessary for this installation. Do not cut or patch the work of other trades but arrange to provide cutting templates in time, or otherwise pay the respective other contractors for changing theirs, to accommodate this work. No cutting into any structural units likely to impair the strength shall be done without the approval of the Architect.

3.6 CLEAN UP

Remove debris, surplus and waste materials, oil, grease or stains resulting from the work performed and leave the premises in a broom clean condition AT THE END OF EACH WORKING DAY. All debris, surplus and waste material shall be removed completely from the job site.

END OF SECTION 230500

SECTION 230593 - TESTING AND BALANCING OF AIR SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Contractor shall furnish all labor, equipment and services necessary for and incidental to Air Systems Testing and Balancing.
- B. The Contractor shall procure the services of an independent testing and balancing agency. The Testing and Balancing Agency (TBA) specializes in testing and balancing of heating, ventilating, air-moving equipment, air-conditioning system and Hydronic systems. The Mechanical Contractor shall award the test and balance contract to the above agency as soon as possible after receipt of contract.
- C. Testing and Balancing shall not begin until the systems have been completed and are in full working order.
- D. Shop drawings must be provided to the TAB firm no later than 30 days after the final, approved shop drawings have been returned by the Architect to the Contractor.
- E. Duct leakage testing shall be the responsibility of the TBA subcontractor.
- F. Fire and smoke damper testing shall be done by the contractor and witnessed by the TAB firm.
- G. The final and complete Test and Balance Report shall be submitted, for approval, not less than two weeks before a final inspection of the Project is requested by the General Contractor. Failure to provide the Report shall be cause to delay the final inspection until the Report is Approved.
- H. Contractor is cautioned that test and Balance Report shall include both Grille counts, and Supply, Return, Outside Air and Exhaust Duct Traverses so that duct leakage can be calculated.

1.2 REFERENCES

- A. AABC – National Standards for Total System Balance.
- B. NEBB – Procedural Standards for Testing, Adjusting, and Balancing.

1.3 SUBMITTALS

- A. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- B. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- C. Provide reports in soft cover, letter size, binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with

air outlets and equipment identified to correspond with data sheets, and indicating, thermostat locations.

1.4 QUALITY ASSURANCE

Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Standards – Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems or Testing Adjusting and Balancing Bureau (TABB)-National Standards for Environmental Systems Balance.

1.5 QUALIFICATIONS

TBA shall be a Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years experience. Contractors may use any FP&C approved TAB firm on a state project. A list of the TAB firms approved by FP&C may be obtained from the project manager.

PART 2 - PRODUCTS

2.1 ADJUSTMENT DEVICES

Replacement of adjustable pulleys, additional balancing dampers, additional fan belts, pressure taps and fitting, hydronic balancing valves and any other devices or equipment required to effect proper testing, adjusting and balancing shall be provided shall be provided by the Contractor at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.

- 11. Duct system leakage is minimized.
- B. Beginning of work means acceptance of existing HVAC conditions.

3.2 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets; Adjust total to within plus 5 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 5 percent of design.

3.3 ADJUSTING – GENERAL

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark setting of valves, dampers, and other adjustment devices allowing setting to be restored. Set and lock memory stops.
- C. After adjustment, take measurement to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At the time of final inspection the TAB agency may be required to recheck, in the presence of the Owner's Representative, specific and random selections of data, air quantities, and air motion recorded in the certified report. Points and areas for recheck shall be selected by the Architect. Measurements and test procedures shall be the same as approved for the initial work for the certified report. Selections for recheck, specific plus random, shall not exceed 10% of the total number tabulated in the report.
- F. In general use VFD's to balance air and water flows where possible.

3.4 AIR SYSTEMS PROCEDURE (MINIMUM REQUIREMENTS)

- A. Test and adjust fan RPM to design requirements.
- B. Test and record motor full load nameplate rating and actual ampere draw.
- C. Test and record system static pressures, fan suction and discharge.
- D. Adjust all main supply and return air duct to proper design CFM.
- E. Test and adjust each diffuser, grille and register (new and existing as indicated on drawings). Reading and tests of diffusers, grilles and registers shall include design velocity (FPM) and as adjusted velocity, design CFM and adjusted CFM.
- F. Test and record outside, mixed air and discharge temperatures (D.B. for heating cycle, D.B. and W.B. for cooling cycle).
- G. In coordination with the ATC contractor, set adjustments of automatically operated dampers to operate as specified, indicated and/or noted.

- H. Test and adjust air handling and distribution systems to provide required or design supply, return, outside and exhaust air quantities.
- I. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- J. Measure air quantities at air inlets and outlets.
- K. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- L. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- M. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- N. Provide system schematic with required and actual air quantities recorded at each outlet or inlet
- O. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- P. Adjust outside air automatic dampers, outside air, return air and exhaust dampers for design conditions.
- Q. Measure temperature conditions across air, return air, and exhaust dampers to check leakage.
- R. Where modulating dampers are provided, take measurement and balance at extreme conditions.
- S. Measure and record pressure differentials between designated spaces.

3.5 REQUIRED REPORTS TO BE SUBMITTED

The following reports shall be submitted, as a minimum, with a complete Title Page, Summary, and Instrument List. All data and nomenclature shall be provided, as required by AABC and/or NEBB Procedure manuals, for each device tested and balanced.

- 1. Electric Motors.
- 2. V-Belt Motors.
- 3. Air Moving Equipment.
- 4. Exhaust Air Data.
- 5. Duct Traverses.
- 6. Air Distribution Test Sheets.
- 7. Outside air data.
- 8. Exhaust fan data.
- 9. Kitchen Hood.

3.8 COMMISSIONING

- A. Balancing Agency shall coordinate with the Mechanical Contractor the Commissioning requirements as here-in-before specified.
- B. Contractor is cautioned that the Owner, thru the Architect, reserves the right to check and verify any and all points and readings of the Test and Balance report. If 15% or more of the points do not agree with the report, then the Contractor shall re-test and re-balance the entire project and submit a complete new Report. If 15% or more of this new Data is independently verified and still does not agree with the Contractor's new Report, then the Owner has the right to hire an Independent Test and Balance Contractor and the Original Contractor shall be held responsible to pay these costs.
- C. All TAB deficiencies shall be corrected when found. Any deficiencies that are (for whatever reason) not corrected immediately shall be shown in the TAB report and listed on a summary sheet in the front of the TAB report. The TAB report must be completed and accepted by the Mechanical Engineer before the project is accepted and all items on the summary sheet shall become punch list items with dollar values assigned to them.

END OF SECTION 230593

SECTION 233000 - HEATING, VENTILATION AND AIR CONDITIONING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.
- B. Refer to Basic Materials and Methods Section 230500 which shall apply to work in this Section.

1.2 DESCRIPTION OF WORK

- A. The work to be done under this Section includes the furnishing of all labor, tools, materials, equipment and services necessary for and reasonable incidental to the installation of complete air conditioning and heating and ventilation equipment as shown on plans and herein specified, excepting only work and/or materials indicated as being done and/or furnished under other sections.
- B. Contractor shall refer to other Sections of the Specifications which may be applicable to or associated with this Section.

1.3 RELATED WORK SPECIFIED IN OTHER SECTION

- A. Electrical Section will provide all power wiring including furnishing and installing of disconnect switches where specified. Control wiring for air conditioning equipment shall be provided by Building Automation and Temperature Control Contractor.
- B. Other Sections will provide and install structural supports for equipment. These supports must be checked and coordinated by this Section so that they suit the equipment which is to be supported.
- C. Other Sections will provide all platforms slabs, lintels and curbs, as directed by this Section, to accommodate the mechanical equipment.
- D. Mechanical Contractor shall provide starters for motors furnished under this Section.

1.4 QUALITY ASSURANCE

- A. These specifications with accompanying drawings, require complete apparatus, fully erected and in successful operating condition. Perform all work in best, most substantial manner.
- B. All equipment furnished and installed under this Section shall be U.L. or E.T.L. approved and labeled where applicable.
- C. All unfired pressure vessels furnished under this Section shall be ASME and National Board stamped.
- D. All manufacturers products shall comply with the requirements of this Section.

- E. Employ qualified sheet metal workers in accordance with SMACNA Duct Construction Standards.
- F. Qualify welding/brazing process and welder/brazer performance in accordance with AWS B2.2, Standard for Brazing Procedure and Performance Qualification, or ASME Boiler and Pressure Vessel Code, Section IX (See 15050). Provide copy of certification for welding and brazing processes.
- G. Soldering processes shall conform to ASME B 31.3, Process Piping and Copper Development Association recommended practices.

1.5 SUBMITTALS

- A. Contractor, before beginning work, shall submit dimensional shop drawings (in accordance with requirements of Division 1), for approval, for all duct systems. Contractor is responsible to coordinate all plumbing, piping, sprinkler, ductwork and electrical to avoid all conflicts. Conflicts encountered after work has started will be corrected at Contractor's expense.
- B. Where the equipment installed is of a different configuration and/or size than that shown on the drawings, Contractor shall assume all responsibility to conform with the intent of the contract documents. The Architect shall be advised of any changes and deviations for his approval. The same shall be true for any field modification required because of "on job" construction conditions.

PART 2 - PRODUCTS

2.1 DIFFUSERS, GRILLES, REGISTERS AND LOUVERS

- A. All sizes shall be as indicated on drawings.
- B. All outlets shall be balanced to obtain specific air quantities free of all objectionable draft and noises.
- C. Diffusers, grilles and registers shall be of normal commercial grade as indicated on Schedule on drawings.
- D. Louvers shall be as scheduled and/or detailed on drawings.

2.2 FIRE DAMPERS

Fire dampers shall be solid sheet curtain type, dynamic closure type corrosion resistant galvanized steel construction. Dampers mounted in the horizontal position shall be closed by a stainless steel negate spring. Damper to be easily reset through standard access panel for required periodic maintenance. Access panels are required for access to all fire dampers, minimum size 12 X 12 inches. Dampers shall be 100% out of air stream. Provide fusible links rated at 160 degrees F.

2.3 ACCESS DOORS

Access doors shall be installed in ductwork wherever required for ready access to any operating part. Doors shall not be smaller than 12 X 12 inches, with brass hinge and sash type fasteners. Ducts 30" or larger shall be supplied with minimum 18 X 18 inch access doors. Doors shall be double wall insulated type, hinged with sash locks and gaskets.

2.4 FANS AND OUTSIDE AIR INTAKES

- A. Size and quantity shall be provided as indicated on drawings.
- B. All roof exhaust fans and roof outside air intakes shall be provided with factory prefabricated curbs.

2.5 HVAC DUCTWORK

- A. Provide and install a complete system of ductwork as herein specified to include, but not limit to supply, return, exhaust and fresh air with grilles, registers, diffusers and appurtenance to provide a complete functional and operational system. Duct sizes shown on drawings are free area dimensions. Design shall be as described in the latest edition of SMACNA manuals and as per the following:
 - 1. Galvanized sheet metal shall be lock form quality per ASTM A653 with a G90 zinc coating.
 - 2. Outside air and exhaust air ducts shall be galvanized sheetmetal with air-tight seams and as per applicable sections of SMACNA manuals for low velocity ducts. Insulate outside air and exhaust air ducts with internal liner if rectangular duct or external wrap if round duct as per SECTION 15250.
 - 3. Supply and return ducts for low pressure system and, low velocity systems shall be galvanized sheetmetal with airtight seams and as per applicable section of SMACNA manuals for low velocity ducts. All ducts shall be insulated with 2" exterior wrap as per Section 15250.
 - 4. Rectangular ductwork for medium pressure, high velocity systems shall be galvanized sheetmetal with airtight seams and as per applicable section of SMACNA manuals for high velocity ductwork. Insulate with 2" exterior duct wrap as per Section 15250.
 - 5. Round rigid ductwork shall be all round single wall spiral pipe and fittings, galvanized steel, as per applicable sections of SMACNA manuals for high velocity duct. Insulate with 2" exterior duct wrap as per Section 15250. Seal all seams, joints and wall penetrations with hardcast as herein specified.
 - 6. All ducts shall be sealed per SMACNA Seal Class A. All joints, longitudinal seams and wall penetrations of all supply, return outside air and exhaust ducts shall be sealed with an elastomeric tape which shall consist of a pressure sensitive layer of modified butyl rubber sealer laminated to a foil backing material which shall conform to surface variations and irregular areas and shall not harden crack or peel. The sealant shall be waterproof and shall be a minimum of 15 mils thick. All ductwork shall be cleaned and prepared and sealant shall be applied strictly in accordance with manufacturer's instructions and recommendations. Sealant shall be Hardcast FG-1402, Suretape #653 or approved equal, at Contractor's option flanged gasketed duct system may be used for POSITIVE PRESSURE SYSTEM ONLY.
 - 7. Flexible round duct where indicated on plans shall be listed by Underwriters' Laboratories, Inc., under UL-181 standards as Class I flexible Air Duct Material complying

with NFPA Standards 90A. Ducts shall be rated on maximum pressure of 6 inches WG positive and 2 inches WG negative. The duct shall be factory fabricated assembly composed of: an inner duct of woven and coated fiberglass providing an air seal and bonded permanently to corrosion resistant coated steel wire helix: a 2" thick fiberglass insulating blanket and low permeable outer vapor barrier of fiberglass reinforced metalized film laminate. Pressure drop not to exceed .15" SP at 500 Fpm through 6" or larger duct. Maximum length of flexible duct shall not exceed 8'-0". Connect flexible round duct with 1/2" wide nylon positive locking nylon straps on inner duct and outer duct.

8. Splitter dampers shall be installed where branches take off of main trunk ductwork, where ducts divide or where shown on the drawings. Splitters shall be fitted with nickel plated damper regulators in finished areas. Splitters shall be factory fabricated in accordance with SMACNA Duct Construction Standards.
- B. Flexible connections shall be provided between each fan unit and ductwork on supply side and also on return side. Material shall be flexible fire-resistive material, minimum 4" wide, UL listed, with no metal to metal contact.
- C. Duct supports for rectangular ducts shall be a minimum 1" X 18 gauge galvanized steel bands. Hanger bands shall be bent under lower corners and secured with self-tapping screws at corners and six (6") inch intervals up the sides. Distance between hangers shall be as recommended by SMACNA manual for low and medium ductwork. Ductwork shall be rigidly supported to prevent vibration. Duct attachments to structure, lower hanger attachments, ducts traps and rods and trapeze angles shall be in accordance with SMACNA Low Pressure and High Pressure Duct Standards.
- D. Where the ducts pass through walls, draft stops or partitions, the space shall be packed with non-combustible materials, filling all voids around duct.
- E. Fire dampers with fusible links shall be installed at all points in ductwork where indicated on drawings, and/or as required by NFPA, 90-A, AND MECHANICAL CODE OF THE IBC.
- F. Provide radius elbows unless specifically indicated otherwise or space prohibitive. Rectangular radius elbows shall be factory fabricated with a centerline radius of not less than the width of the duct. Round duct elbows shall have a minimum center line radius of 1-1/2 times the diameter of the duct and shall be smooth where possible. Provide square elbows where indicated or space prohibits the use of radius elbows. Square elbows shall be factory fabricated with double thickness airfoil turning vanes pre-assembled and securely attached to runners.
- G. In general, vertical risers and other duct runs, where the method of support specified above is not applicable, or not specifically detailed on drawings, shall be supported by substantial angle brackets designed to meet field conditions, installed to allow for duct expansion and approved by Architect.
- H. Provide exposed operators for operation of dampers and splitters in inaccessible ceilings, operators shall be chrome plated.
- I. Maximum duct leakage shall be +/- 5%, SMACNA Seal Class A. Supply air, outside air, return air and exhaust air systems shall be designed for 1.0" static pressure. Construct ductwork in accordance with SMACNA Duct Construction Standards for the specified pressure class.
- J. Install Automatic dampers, airflow stations and other duct mounted devices.
- K. Volume dampers shall be opposed blade type with 2" standoff and locking quadrant.

2.6 PIPING AND PIPING IDENTIFICATION

All piping at each piece of equipment shall be stencil to show the service and direction of flow. Stencils shall be black on a white background with letters one (1") inch high spaced at approximately forty-eight (48") inches apart by equipment or 10 foot intervals along piping runs.. Pressure-sensitive pipe markers ANSI Standard A 13.1 may be used in lieu of stenciling.

2.7 GAS UNIT HEATERS

- A. The unit heaters shall be propeller type completely packaged and arranged for ceiling suspension with directional louvers. Capacities shall be as listed in the schedule on the drawings.
- B. Gas heat exchanger shall be stainless steel.
- C. Controls shall be provided with unit heater and shall consist of unit mounted thermostat, automatic high limit and fan time delay relay. This contractor shall install controls and make operational.
- D. Motors shall be permanently lubricated with internal overloads.
- E. Each unit shall be U.L. listed.

2.8 ROOFTOP UNITS

- A. Units shall be rated, factory, internally wired, rooftop heat pumps fully charged with R-410a, 100% run tested at the factory and shall have the capacities and characteristics as scheduled on the drawings. Units shall be UL listed and labeled for single point power connection.
- B. Unit casings shall be constructed of zinc coated, heavy gauge, galvanized steel and the exterior surfaces finished with a weather resistant baked enamel finish. Cabinet construction shall allow for all maintenance to be performed from one side. Service panels shall have sheet metal hinged access doors for access to filter/evaporator, supply fan/heat and the compressor/controls. All exposed vertical panels and top covers in the indoor section shall be insulated with a cleanable foil-faced glass fiber material. The base of the unit shall be insulated with ½ inch, 1 pound density, foil faced closed cell insulation. The unit's base pan shall have no penetrations within the perimeter of the curb except the 1 ½ inch high horizontal supply /return openings. The top cover shall be one piece construction or where seams exist, it shall be double-hemmed and gasket sealed. Tops shall be sloped to prevent water pooling on unit top. Unit shall be provided with a removable, double sloped drain pan. Unit shall be provided with factory roof curb.
- C. Units shall have 2 inch factory supplied, MERV 13 pleated filters.
- D. Units shall have high efficiency direct drive, hermetic, scroll type compressor with a centrifugal positive oil pump. Motors shall be suction gas cooled. Compressors shall have crankcase heaters, and internal temperature and current sensitive motor overloads. Units shall have compressor staging as indicated on the drawings with 2-stage units where possible.
- E. Each refrigerant circuit shall have a thermal expansion valve, service pressure ports and factory installed lines filter driers. Hot gas reheat and dehumidification control cycle shall be provided.

- F. Evaporator and condensed coils shall be 5/16 inch copper tubes with mechanically bonded aluminum plate fins. Coils shall be leak and pressure tested at the factory before shipment.
- G. The condensed fan shall be direct drive, propeller type, statically and dynamically balanced, draw through in the vertical position. The motor shall be permanently lubricated and shall have built in thermal overload protection.
- H. The evaporator fans shall be FC, belt drive with an adjustable motor sheaves. Motors shall be internal thermally protected.
- I. Units shall be provided with factory installed electric heating elements. Elements shall be constructed of heavy duty nickel chromium elements internally connected and UL or CSA certified. Each heater package shall have; automatically reset high limit control; heating element contactors; and individually factory fuses meeting NEC and CEC requirements.
- J. Units shall be completely factory wired for electronic microprocessor controls including control transformer and pressure lugs for single point power connection. Controls shall include; a factory provided and wired zone temperature sensor located in the return air; electronic thermostat module that shall interface to the unit microprocessor and control the unit for the desired stages of cooling and heating; phase monitor for the protection of the motors and compressors against phase loss, phase imbalance and phase reversal and shall be equipped with an LED "on or fault" indicator; a dedicated differential pressure switch with zone sensor and indicator lights for active fan failure and/or clogged filter notification; zone sensor control for automatic programmable night setback system malfunction and remote sensor. Each unit shall be provided with a factory automatic changeover night set back thermostat for control operations as here-in-after specified.
- K. Units shall be provided with motorized outside air dampers. Dampers shall be set to the outside air quantities as scheduled on the drawings. Once set the dampers shall open to the set position when the fan starts and close to full closed when the fan shuts down.

2.9 DX SPLIT AIR CONDITIONING SYSTEMS

- A. Each system shall have the capacities and configuration as listed in the schedule on the drawings.
- B. Furnace section enclosure shall be insulated and constructed of galvanized steel, bonderized and finished with baked enamel. The variable speed fan motor shall be factory lubricated, have internal overload protection and be resiliently mounted. Fan-motor assembly shall slide out for service. Reversible filter rack shall have duct connection flanges and be equipped with permanent-type filter that slides out for maintenance.
- C. Cooling coil shall be constructed with aluminum plate fins mechanically bonded to nonferrous tubing with all joints brazed. Coils shall have a factory-installed refrigerant metering device and be equipped with refrigerant line fittings which permit mechanical connections. Coil casing shall be insulated and constructed of galvanized steel, bonderized and finished with baked enamel. Coil shall have a double slope insulated drain pan.
- D. Compressor shall be of the welded-hermetic type 2 stage scroll with internal vibration isolation and be covered with a shield of muffle operating sound. Compressor motor shall have both thermal and current-sensitive overload devices, internal high-pressure protection, high- and low-pressure cutout switches, start capacitor and relay, crankcase heater and relay and a timer to prevent compressor rapid cycle.

- E. Condenser coil shall be of circular construction. Tubes shall be aluminum with mechanically bonded aluminum plate fins. Condenser fan shall be propeller-type, direct-driven, and arranged for vertical air discharge. Fan motor shall be factory lubricated, inherently protected and resiliently mounted and shall have high and low speeds.
- F. Electric heaters where scheduled shall be insulated and have large front service access door. Heating elements shall be sequenced on and off for multi-stage operation as scheduled on the drawings. Heater shall be equipped with both thermal and current overload devices, and the required heating and cooling system controls, including control circuit 24-volt transformer.
- G. In addition the system shall have the following:
 - 1. Louvered coil guard.
 - 2. Liquid line shutoff.
 - 3. Vapor line shutoff.
 - 4. Filter drier.
 - 5. R-410 refrigerant.
 - 6. 5-year compressor warranty.

2.10 CONTROLS

Each air conditioning system shall be controlled by a low voltage wall mounted electronic programmable night setback heating-cooling thermostat with fan "on-off-auto" switch. Thermostat shall have humidity monitoring function, which will cycle cooling in setback mode and/or temporarily over cool space by 2 degrees to lower humidity. With fan switch in "off" position entire system shall be de-energized. With fan switch in "auto" position fan shall cycle around thermostat setting. "On" position shall allow continuous fan operation. Compressor or heater, shall cycle around thermostat and selector setting.

Furnish and install a 125 degree F. firestat in the return air inlet of all fans and blowers. Firestat and detector shall be manually reset type and shall interrupt fan service if activated. See plans for required duct detectors.

2.11 PIPING AND FITTINGS

- A. Furnish and install all piping related to air conditioning systems including refrigerant piping, air conditioning condensation drains, and other miscellaneous piping.
- B. All piping shall be installed parallel and square with building lines and shall be sloped to permit drainage, with suitable provision for drainage at all low points.
- C. Piping shall be arranged to maintain headroom and keep passageways clear and where necessary shall be offset to maintain the required clearance and conform with the structural features of the building. Contractor shall determine in advance of construction locations for all piping sleeves, hangers, etc. No allowance will be made for extra due to inaccurate location of sleeves, piping or equipment.
- D. All piping shall have provisions for expansion and contraction with anchorage at each point shown on the plans and/or as required.
- E. Full length pipe shall be used where possible, short lengths and couplings will not be permitted. After cutting, all pipes shall be reamed out to full bore and before erection, all cutting and foreign matter shall be removed from the inside of pipes. Screwed joints shall be made tight without caulking or the use of lead or paint and no lubricant shall be used except

flake granite and cylinder oil paste, or approved pipe compound applied to make threaded pipe.

- F. Pipe sleeves shall be provided for the passage of all pipe through walls, floors and partitions.
- G. All condensate drain piping shall be installed using ASTM B88 type "L" hard drawn copper with wrought copper sweat fittings. Changes in direction of piping shall be made with short turn tee pattern or 45 degree wye fittings with brass cleanout plug. Insulate drain piping, minimum drain on fan coil units – 3/4", air handling units – 1-1/4".
- H. Refrigerant piping shall be type "L" hard drawn copper wrought copper sweat type fittings and silfos solder. Provide a catch-all liquid line strainer and a liquid line moisture indicator sight glass at each condensing unit. Strainer shall be installed in a three valve by-pass. Completely evacuate system before providing refrigerant operating charge as recommended by equipment manufacturer. Pipe sizes shall be as recommended by equipment manufacturer for installation shown. Insulate per Section 220700.

2.12 AIR PURIFICATION UNIT

- A. The air purification system shall consist of an air filtration system and activation system to capture, reduce or eliminate vehicle exhaust products. The unit shall be Air Hawk 3000-XL or approved equal. The system shall be mounted and installed per the manufacturer's recommendations.
- B. The unit shall consist of a MERV 11 pre-filter, MERV 16 HEPA grade primary filter and a gas-phase filter with a 50/50 blend of activated carbon and potassium permagnate on zeolite.
- C. Photo – Catalytic Oxidation Chamber: The photo-catalytic oxidation chamber shall utilize a grid made of aircraft aluminum honeycomb material with 1/8" cells, 3/4" thick with a minimum of 70 sqft. of surface area. Titanium dioxide shall be impregnated throughout the entire grid. The surface of the grid shall be illuminated with two UV lamps of at least 3milliwatts/CM².
- D. The unit shall have a 16 gauge steel cabinet with holes pre-drilled for the 3/8" support rods. The cabinet shall be powder coated and baked finished. Access doors shall be provided and the unit shall be equipped with 4-way adjustable diffusers.
- E. The motor blower shall be direct drive, forward curved, 1 HP, 208V, single phase, permanent split capacitor motor.
- F. Control Panel: The unit shall have a NEMA 4X control enclosure with start/stop push button, power light/motor overload indicator, diagnostic scree, time boost push button, sequenced motor starting, long range photo-electric, CO/NO₂ monitor, LED filter change.
- G. Unit shall include necessary controls and photo eyes to operate the unit upon opening and closing of any of 4 roll up doors for a timed period of 10 minutes (adj.). System shall also be set for automatic mode where any vehicle passing the photo eye operates the system. Provide all necessary controls, wiring and hardware to operate the system.

2.13 EXHAUST HOODS (HOOD#1 and #2)

- A. The hood shall be constructed of 18 & 20 gauge (type 304) polished stainless steel. Hood shall have fire suppression system factory installed into the hood system. Activation of the mechanical fire suppression system shall be by 212 or 280-degree fusible link (30" vs. 36" sizes). Fire suppression agent will be Amerex 660 Low PH wet chemical suppressant. Unit shall include centrifugal fan with air delivery of 380 to 610 cfm depending of calibration of unit. Unit shall

include fuel shutdown option for Gas, Electric or Dual Element Devices. The hood system will also have multiple alarm and monitoring contacts factory installed into the hood.

- B. Designer to verify CFM and pressure drop with manufacturer.

Greenheck Model	Width	Fan Type	Venting	CFM (at hood)	Duct Length (max)
GRRS-36-R-G-N	36	Internal	Rear	500	N/A

- C. Hood system include commercial-grade grease extractor type, high efficiency cartridge style baffle filters of adequate number and sizes to ensure optimum performance in accordance with manufacturer's published information. The filter housing shall terminate in a pitched, full-length grease trough, which shall drain into a removable grease container.
- D. Shatter proof light fixtures shall be included in the hood system. Wiring shall conform to the requirements of the National Electrical Code (NEC #70).
1. Pre-Installed Fire protection system to provide duct entry, plenum, and surface protection for hood system and equipment located below ventilator. Provide submittal and review fee for hood suppression system to State Fire Marshal. Include necessary cut sheets, calculations, applications and checklist. Requirements can be found on the state fire marshal website.
 2. System interconnected with included shunt trip breaker and gas solenoid valve of equipment located below ventilator for power and fuel shutoff during system actuation.
- E. Environmental Monitoring / Internal Monitoring / Pre-Suppression
1. Two temperature sensors are located on the inner face of the hood; one at a medium set point, the other at high. Under cooking conditions, when the medium set point is reached, the fan is turned on high. This feature dissipates the heat from the area but also draws it into the unit, past the fusible links in the system. If temperatures continue to rise and the high temperature set point is reached, the system reacts by shutting down power to the range prior to suppression system release. When this occurs, the unit's internal alarm is activated so that occupants are notified that the system is working to prevent further escalation of a potential fire. This is considered two stages of pre-suppression, where the unit is interacting with the cooking environment - working to minimize the risk of a fire event

Should temperatures continue to rise, fire is present. The fusible links will melt, mechanically actuating the suppression system and releasing a low PH wet chemical agent across the cook-top. At actuation, the system will also make a second attempt to shut down power to the range; in the event of a flash-fire, or something that happens too quickly to register with the temperature sensors. The system will continue to sound its internal alarm while also communicating a "fire code" back to a monitored alarm panel.

The PLC Self-Monitoring-System also monitors the entire suppression assembly for completeness and continuity. If the suppression system is ever compromised through a loss of pressure or broken connection, or tampering of any kind, the unit reacts by shutting down power to the range. In this case the suppression system is compromised therefor the range shouldn't be in use. Under this condition, the system communicates a separate "maintenance code" saying that the unit is down and needs service. When preemptive shutdown occurs, the system and the cooking equipment will not come back on-line until the GRRS is reset.

F. Options

1. Manual Pull Station (MPK) – Mechanical assembly allowing the fire suppression system to be actuated manually normally located at the point of egress.
2. Powder Coating (PC) – The hood system can be powder coated in a variety of standard colors, the manufacturer can also color match.
3. NFPA101 Upgrade (NFPA101) – Combines MPK, CLBx and an upgraded fan to deliver >500cfm in order to comply with the requirements of the NFPA Life Safety Code.

2.14 PIPING AND FITTINGS

- A. Furnish and install all piping related to air conditioning systems including refrigerant piping, air conditioning condensation drains, and other miscellaneous piping.
- B. All piping shall be installed parallel and square with building lines and shall be sloped to permit drainage, with suitable provision for drainage at all low points.
- C. Piping shall be arranged to maintain headroom and keep passageways clear and where necessary shall be offset to maintain the required clearance and conform with the structural features of the building. Contractor shall determine in advance of construction locations for all piping sleeves, hangers, etc. No allowance will be made for extra due to inaccurate location of sleeves, piping or equipment.
- D. All piping shall have provisions for expansion and contraction with anchorage at each point shown on the plans and/or as required.
- E. Full length pipe shall be used where possible, short lengths and couplings will not be permitted. After cutting, all pipes shall be reamed out to full bore and before erection, all cutting and foreign matter shall be removed from the inside of pipes. Screwed joints shall be made tight without caulking or the use of lead or paint and no lubricant shall be used except flake granite and cylinder oil paste, or approved pipe compound applied to make threaded pipe.
- F. Pipe sleeves shall be provided for the passage of all pipe through walls, floors and partitions.
- G. All condensate drain piping shall be installed using ASTM B88 type "L" hard drawn copper with wrought copper sweat fittings. Changes in direction of piping shall be made with short turn tee pattern or 45 degree wye fittings with brass cleanout plug. Insulate drain piping, minimum drain on fan coil units – 3/4", air handling units – 1-1/4".
- H. Refrigerant piping shall be type "ACR" hard drawn copper wrought copper sweat type fittings and silfos solder. Provide a catch-all liquid line strainer and a liquid line moisture indicator sight glass at each condensing unit. Strainer shall be installed in a three valve by-pass. Completely evacuate system before providing refrigerant operating charge as recommended by equipment manufacturer. Pipe sizes shall be as recommended by equipment manufacturer for installation shown. Insulate per Section 220700.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment and controls shall be installed in accordance with manufacturer's recommendations. Installation, adjustments and starting shall be done under supervision of manufacturer's representative.
- B. All ductwork and equipment shall be installed in a neat and workmanlike manner in accordance with the guidelines of NFPA 90-A, SMACNA and the best practice of the trade.
- C. Provide manual firestats, set at 125 degrees F, in return inlets of all fans and blowers and all exhaust fans of 600 cfm and over.
- D. Upon completion of the installation of all work and equipment the Contractor shall start all equipment and make all necessary tests and adjustments to place entire heating, ventilating

and air conditioning systems in a satisfactory condition for continuous safe operation of facilities.

END OF SECTION 233000

SECTION 260500 - ELECTRICAL GENERAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish all labor, tools, materials, fixtures, equipment, accessories, transportation, etc., required for complete electrical lighting and power systems, complete with necessary auxiliaries as indicated on drawings and as hereinafter specified.
- B. The GENERAL CONDITIONS of the Contract and Architectural Drawings and Specifications shall apply to all work under this Section. Separation of Specifications into Sections is for convenience only and is not intended to establish limits of work or liability. The following are the Sections that apply to this project.

260500 - Electrical General
260600 - Electrical Materials and Methods
263213 – Emergency Generator (Owner furnished contractor installed)
265000 - Lighting Fixtures
270500 – Telecommunication and Video Distribution Systems
283000 – Fire Alarm System
- C. In general, the work shall consist of the following installations:
 - 1. Panelboards, feeders, switches and complete systems per plans.
 - 2. Power wiring to all mechanical and air conditioning equipment.
 - 3. Electrical lighting and appliance systems complete with wiring, fixtures and lamps.
 - 4. Wiring and connections for equipment indicated on Architectural drawings.
 - 5. Fire alarm system.
 - 6. New underground electrical service.
 - 7. Phone, data and video systems complete with wiring, outlets and head end equipment.
 - 8. Owner furnished contractor installed natural gas generator
- D. Prior to submitting quotation for electrical work, Contractor shall visit and examine the job site in order to become familiar with all existing conditions pertinent to the work to be performed thereon. No additional compensation will be allowed for failure to be so informed.
- E. It is the intent of these specifications that in all particulars, the materials and workmanship shall conform to the best practice and that the equipment and accessories as furnished and installed shall be complete and ready to operate.
- F. All materials shall be new, except where otherwise indicated, and shall conform with the standards of underwriters' Laboratories in every case where such a standard has been established for the particular type of material in question.
- G. The drawings showing the layout of electrical work indicate approximate location of the outlets, receptacles, panelboards and other electrical equipment, unless noted otherwise. The runs of feeders and branches are schematic only and are not intended to show the exact routing of conduits. The final determination of the routing shall be governed by structural conditions, other conditions and other construction. The Contractor shall consult all drawings which may affect the location of any outlet, apparatus, or equipment to avoid possible interference and any reasonable changes in the location of an outlet, apparatus or equipment, up to the time of rough-in, is reserved by the Architect, and any minor deviations shall be made without additional cost. It shall be the Contractor's responsibility to see that all

equipment such as junction boxes, panelboards, switches, and other apparatus, as may require maintenance from time to time, are made easily accessible. Although the location of the equipment may be shown on the drawings, the construction may disclose the fact that such location does not make its position readily accessible, in which case the Contractor shall call the Architect's attention to the condition before advancing the construction to a point where a change in location would require additional cost.

1.2 MEASUREMENTS

Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories necessary. The Contractor shall carefully investigate structural conditions, walls, furring and chase locations and room finishes and shall make actual measurements on the job so that the panelboards, switches, receptacles, lighting fixtures and accessories shall fit.

1.3 LAWS, CODES AND PERMITS

- A. Latest edition of the following listed established standards constitute part of the specification requirements.

National Electrical Code, 2011 (NFPA No. 70)
Applicable State Requirements
Underwriters' Laboratories (UL)
Electrical Testing Laboratories (ETL)
American National Standard Institute (ANSI)

- B. The Contractor shall apply for all permits and pay all fees incidental to the carrying on of the electrical work. This Contractor shall give notice to the Architect in ample time for the work to be inspected and approved as it progresses and no work shall be concealed until inspected and approved by Architect, should the plans or these specifications in any way conflict with the Code, or State Rules, these latter are to be followed, without expense to the Owner, but the Architect shall be notified of this condition and approval secured before changes are made.
- C. Upon completion of the installation, a certificate of approval from the Electrical Inspection Department having jurisdiction thereon shall be furnished to the Owner, and all fees paid by the Contractor. The certificate of inspection shall not release the contractor from any defects to material, workmanship or installation, should any develop within one (1) year after final acceptance of the work.

1.4 JOB CONDITIONS

- A. Accompanying drawings, including plans, details, diagrams, notes, etc., are shown to limit and explain structural conditions, construction requirements, sizes, capacities and method of installation and erection. Structural and other conditions may require certain modifications and adjustments from conditions shown. Such deviations are permissible; however, specific sizes capacities and requirements affecting the satisfactory performance and operation of the installation shall remain unchanged. Make allowance for normal job conditions and interferences.
- B. Ask for details whenever uncertain about method of installation. Lack of details not requested shall not excuse improper installation and correction shall be responsibility of the Contractor.

- C. Schedule and perform all electrical work to avoid delays to the Contractor and other trades.
- D. All piping, conduits, conductors and other electrical items in way of construction, shall be rerouted, relocated or otherwise adjusted to work out with such construction or changes shown or specified in any or all of various sections of specifications. Unknown electrical devices that are encountered will be referred immediately to Architect for method of disposition before continuation of work.
- E. The Contractor shall review the architectural drawings to become familiar with the phasing of construction required for this project.

PART 2 - PRODUCTS AND INSTALLATION

2.1 APPROVALS

- A. Name of manufacturer or catalog numbers are mentioned herein in order to establish a standard as to design and quality. Other products similar in design and of equal quality may be used if submitted to the Architect and approved by him.
- B. Within thirty (30) days after award of General Contract, Contractor shall submit complete dimensional shop drawings and descriptive literature covering the following equipment and materials. Written approval thereof must be obtained before ordering or installation.

Panelboards
Safety Switches
TVSS

Wiring Devices and Plates
Lighting Fixtures

Conductors
IT devices and cable

- C. Comply with requirements of Division 1 Sections regarding submittals, number of copies, and procedures.

2.2 PROTECTION OF FIXTURES, MATERIAL AND EQUIPMENT

- A. Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury or loss, except as may be caused by agents or employees of the Owner. He shall adequately protect adjacent property as provided by law.
- B. Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work, the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the Architect.

2.3 CUTTING, PATCHING, AND SEALING

- A. All cutting and patching for the work of this Section shall be in accordance with the requirements of the GENERAL CONDITIONS. The Contractor shall perform all necessary cutting and patching required for the installation of work. Where floor or roof is cut or penetrated the structural integrity shall be maintained or restored. Cutting of structural members is prohibited except with prior approval of the Architect.
- B. Penetrations of all walls, floors, and ceilings shall be sealed with a material capable of preventing the passage of flames and gases in accordance with the requirements of the test

standard ASTM-E-814 for fire stops. The integrity of the fire rating, as indicated on the architectural drawings, shall be maintained. See Sealant Specification for materials.

2.4 CLEANING UP

- A. This Contractor shall promptly remove from the jobsite all debris, surplus and waste materials, empty crates and cartons resulting from his work.
- B. This Contractor shall remove all oil, grease or other stains resulting from his work performed in the building or the exterior thereof.

2.5 TESTING AND BALANCING

- A. Make tests which may be required by the Owner or the Architect in connection with the operation of the electrical system in the building.
- B. Balance all single phase loads connected to the panelboards in the building to insure an approximate equal division of these loads on main secondary power supply serving building.
- C. All tests shall be made in accordance with the latest standards of the IEEE and the NEC.
- D. The installation shall be tested for performance, grounds, and insulation resistance. "Megger" type instrument shall be used. Circuit continuity tests and operational tests on all equipment furnished and/or connected by him shall be made by the Contractor after such equipment has been installed.
- E. The tests shall be made in the presence of the Architect or his representative. The Contractor shall notify the Owner or his representative. The Contractor shall notify the Owner and the Architect at least seventy-two (72) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.
- F. Refer to the Electrical Feeder Diagram on the drawings and the NEC section 517 for additional testing required.

2.6 PAINTING

- A. Contractor shall touch-up or refinish all items of electrical equipment furnished with a factory finish coat of paint and which may have been damaged regardless of cause.
- B. All electrical equipment such as switches, panelboards, motor controllers, etc., shall be suitably identified with mica nameplates.
- C. See PAINTING SECTION for painting by others.

2.7 GUARANTEE

Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering all electrical work under this Contract for a period of one (1) year from date of notice of final acceptance. Upon notice from the Owner, Architect or the Consulting Engineer during the Guarantee period, the Contractor shall replace defective materials and correct faults of

workmanship and repair any damage caused thereby promptly and free of any charge. Fuses and lamps are excluded from the guarantee.

2.8 CONTRACTOR'S QUALIFICATIONS

The Contractor, bidding on this portion (Electrical Division) must be licensed to perform such work as required by State and Local laws.

2.9 DIRECTORY CARDS, NAMEPLATES AND EQUIPMENT LABELS

Provide in the directory frame of each panelboard and for each feeder switch or circuit breaker, neatly typed directory cards indicating the general area and type of electrical load.

2.10 SUBSTITUTION

- A. All specified material, equipment, fixtures, etc., entering into the work under this section of contract are subject to the prior approval or disapproval of the Architect. Refer to Division 1 Sections for approval procedures.
- B. Materials, equipment, fixtures, etc., herein named or indicated on drawings establish the type, size, appearance and quality required of products other manufacturers must meet to be acceptable.
- C. Requests for substitutions must include necessary data to conclusively demonstrate equality in type, size, appearance, quality, etc. Any deviation in the opinion of Architect may be cause for rejection.

2.11 TEMPORARY POWER AND LIGHTING

- A. The Contractor shall make all necessary arrangements for furnishing a temporary power supply with service as required by the General Contractor and various Sub-contractors employed in connection with the work to be performed on the job site. The Contractor shall cooperate with other Sub-contractors to insure that adequate power and lighting service is available at all times during the progress of the work.
- B. The Contractor shall include in his price all fees, assessments and permit costs for the new electrical service.

2.12 CONNECTIONS TO MECHANICAL EQUIPMENT

- A. All power wiring associated with the MECHANICAL DIVISION of these Specifications shall be as specified in the Electrical Division.
- B. All HVAC control wiring shall be as specified in the Mechanical Division.
- C. Overload elements in all starters shall be selected according to actual motor nameplate full load current. Responsibility for this coordination shall lie with the Contractor who has furnished the particular starter. Starters, for motors furnished by Mechanical Contractor, shall be furnished by Mechanical Contractor.
- D. All manual starting switches shall be furnished and installed by Electrical Contractor.

- E. All disconnect switches shall be furnished and installed as indicated and as required by the Electrical Contractor.
- F. All firestats will be furnished and set under the MECHANICAL DIVISION electrically connected in the branch circuit wiring by the Electrical Contractor.
- G. Refer to MECHANICAL DIVISION and to MECHANICAL PLANS for any additional electrical work required.
- H. Should the Mechanical or any other Contractor desire to use equipment requiring larger motors than those indicated on the drawings or equipment requiring more elaborate controls than the equipment described in these specifications, the responsible contractor shall reimburse the Electrical Contractor for any extra materials or labor furnished.
- I. All wiring and interconnections necessary for speed controllers on exhaust fans shall be furnished and installed by the Electrical Contractor.

2.13 CONNECTIONS TO ARCHITECTURAL EQUIPMENT

- A. Coordinate all rough-in for all equipment specified by Architect. All mounting heights and locations shall be determined from shop drawing submittals prior to rough-in.

2.14 NEW SERVICE TO BUILDING

- A. This Contractor shall make arrangements for the provision of the required service and shall pay all fees and assessments.
- B. All arrangements of service installation shall comply with requirements of the contract documents and approval of Utility Provider. Contractor shall coordinate with Utility Provider for the provision of all raceways, manholes, and points of termination as shown on the contract documents prior to installation. Any conflict shall be brought to the attention of the Architect and Consulting Engineer immediately.

END OF SECTION 260500

SECTION 260600 - ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Applicable items of this Section shall apply to all sections of ELECTRICAL.

PART 2 - PRODUCTS AND INSTALLATION

2.1 METHODS OF WIRING

- A. No wire shall be smaller than No. 12 except those for fixture drops and for control circuits of equipment. All wire shall have 600-volt insulation equivalent to type THHN/THWN unless otherwise noted on the drawings.
- B. All wiring shall be run in conduits sized as shown on the drawings and as herein after specified. Conductors shall be continuous from outlet to outlet and no splices shall be made except in outlet or junction boxes.
- C. Homeruns to panelboards may be collected in one or more conduits provided all circuiting is done in accordance with Code requirements and the maximum unbalanced current does not exceed the capacity of the neutral conductors.
- D. Powdered soapstone or approved pulling compound shall be used as a pulling lubricant for all non-lead covered conductors.
- E. All empty conduits installed shall contain a #14 fish wire.
- F. Conduit sizes shall conform to the requirements of the National Electric Code and/or sizes shown on the drawings. Minimize size conduit shall be 1/2".
- G. No conduit shall be routed within concrete floor slabs, except as required to serve floor boxes where shown on the drawings. Where required for power/data service to floor boxes, conduit in slab shall be 3/4" PVC. Conduit shall be installed in accordance with requirements of Structural Engineer and shall exit floor slab at nearest wall or to accessible ceiling space below. No more than 10 feet of conduit shall be allowed in floor slab per location. Vertical penetrations of concrete slabs shall be sleeved and sealed. Where conduits turn out of slab, conduits shall be transitioned to rigid steel conduits. PVC conduits are not allowed to pass thru slab. In area below a distribution panel, contractor shall provide enhancement of reinforcing as required by structural engineer. Size and location of all sleeves are subject to the approval of the structural engineer. Conduits routed below the first floor slab shall be Schedule 40 PVC, supported using 3/8" stainless steel threaded rods. Supports shall be spaced in accordance with NEC-346-12. Any exposed conduits on exterior of building, shall be heavy wall hot dipped galvanized rigid conduit. Type MC cable shall be allowed in interior walls only.
- H. Underground conduits for branch circuit conductors shall be Schedule 40 PVC direct buried minimum 24" below grade. Sweep elbows shall be galvanized rigid steel, or Schedule 40 PVC encased in concrete. All underground conduits shall be installed with metallic marker tape buried 12" below grade, directly above conduit, and continuous for entire length of conduit.

- I. Conduits in metal stud walls, exposed within mechanical and electrical rooms, and above ceilings shall be EMT. Conduits in hollow cmu walls shall be EMT with concrete tight set screw fittings. Conduits in solid, infilled cmu walls shall be Schedule 40 PVC.
- J. Aluminum conduit may be used in lieu of steel conduit in sizes over 2" provided same does not run underground or in or passing through concrete.
- K. All raceways shall be concealed unless otherwise indicated.
- L. All conduit and tubing shall be Armco, Plastic Wire & Cable, Steelduct, Republic, Allied, or approved equal.
- M. Branch circuit conduits feeding outlets in masonry walls shall be concealed in masonry. Where outlet boxes are indicated in bare masonry walls, the box shall be mounted so that two edges of the box or plaster cover will fall in a mortar joint. Where switchboxes will not accommodate the number of conductors required and 4" square or larger boxes are installed, the device covers shall be manufactured by Steel City Manufacturing Co., or Appleton, 1" minimum in depth, with straight rectangular openings for drywall construction. Where grouting is required to fill up improperly cut openings in the masonry, the work will be rejected. Electrical Contractor shall cooperate with the bricklayer to insure a neat and workmanlike job.
- N. Solderless Fixed spring connectors (T & B 10-100, Ideal wrap-cap, or equal) shall be used for all branch circuit wiring and fixture connections on all conductors #10 AWG and smaller. Split bolt or 2 bolt connectors (T & B 6 HPW, O-Z Gedney PMX, or equal) shall be used for connections and splices on all conductors #8 AWG or larger.
- O. Connections to all motors not equipped with a portable cord shall be made with a short piece of flexible metal conduit between rigid conduit system and motor terminal box. Ground bond of separate copper conductor shall be made between motor frame and rigid conduit system. In all outdoor locations, liquid tight flexible metal conduit shall be used.
- P. All recessed fixtures, unless they contain a box approved for THW wire shall be wired with THHN, in four feet (4') of flexible metal conduit from a box at least one foot (1') from the fixture. Not more than two individual or two rows of continuous fixtures shall be connected to any one of these outlet boxes. This box shall be located above the ceiling and shall be accessible by removing fixture. Installation of blank covers on ceilings to provide access to such boxes will not be acceptable.
- Q. Splices in all low voltage wiring shall be made at terminal blocks furnished with the equipment. At junction boxes or where other splices are required, these splices shall be soldered.
- R. Other routings than those indicated may not be used without the approval of the Architect, but Contractor shall make allowance for possible obstructions to routes indicated. Conduits shall be grouped together and run on common hangers parallel to building lines in areas of open ceilings.
- S. Surface mounted raceways shall be 2-piece, steel, with all fittings and mounting hardware necessary for complete installation.

2.2 WIRING IN RACEWAYS

- A. Conduit sizes shall conform to requirements of the National Electrical Code and/or sizes shown on drawings.

- B. It is not mandatory that all conduits be routed as shown on the drawings. Other routings facilitating speed and ease of installation may be used, provided the general intent of these specifications is followed and the specific intent of the particular circuit or circuits and the National Electrical Code are not violated; such changes and must be approved by the Architect before work is done. Contractor shall make full allowances for possible obstructions to these routes, as no extra charges will be allowed for added lengths that may be necessary.
- C. Conduits shall be installed in a neat appearing manner and shall be rigidly secured in place. The use of wooden plugs in masonry or concrete as a base to fasten raceways will not be permitted. Approved anchors only shall be used for this purpose. Exposed conduits shall be installed with runs arranged parallel or perpendicular to walls and ceilings, with rigid angle turns consisting of symmetrical bends, condulets and junction boxes. Bends and offsets shall be held to a minimum. Conduits shall be kept at least six (6") inches from parallel runs of hot piping flues, or other hot objects.
- D. Conduits shall be cut with a hacksaw; ends must be square, threads cut and cleaned before reaming. Conduits must be securely fastened to all outlet and junction boxes with two locknuts and one bushing of approved make, care being exercised to see that full number of threads project through to permit bushings to butt up tight against the end of the conduit, after which the locknuts shall be screwed tight. Conduit shall be joined by approved conduit couplings and shall have ends butted in all cases where couplings are used. Use three piece threaded electrical unions where standard couplings cannot be used. The use of running threads will not be permitted. Where condulets cannot be joined by standard thread couplings, approved type conduit unions shall be used. Connectors and couplings for electric metallic tubing shall be of the set screw type. Couplings for rigid heavy-wall conduit shall be of the threaded type.
- E. Conduit fittings shall be Crouse-Hinds or Appleton grounding type, or approved equal.
- F. Insulated bushings shall be provided for all conductors #4 and larger.
- G. No wire shall be pulled in until the conduit system is complete and plastering dried. This does not include the white finish coat of plaster.
- H. During Construction, all outlet boxes and conduit stub-ins shall be suitably protected against the entrance of foreign material.

2.3 BOXES AND FITTINGS

- A. Boxes and fittings shall conform to requirements of Article 314 of the N.E.C.
- B. Junction and pull boxes required by field conditions shall be installed whether indicated on drawings or not
- C. The location of outlets not specifically dimensioned on the drawings should be considered as approximate only. The Contractor shall study the general plans with relation to the spaces surrounding each outlet in order that his work fit the work of others so that when fixtures or other fittings are installed, they will be symmetrically located according to design requirements.
- D. Use only galvanized outlet and junction boxes, conduit fittings, covers, and supports for interior wiring and cast fittings and boxes with gasketed covers for exterior wiring. The Contractor shall provide all necessary structural supports for boxes and cabinets. Kindorf or Unistrut channels shall be used where applicable.

- E. Boxes for concealed outlets shall be 4" square by 1-1/2" deep, or larger, with raised device covers as required, except that 2-3/4" deep switch boxes may be used where only one conduit enters a box.
- F. Boxes for concealed ceiling outlets shall be 4" octagonal by 1-1/2" deep, or larger. Boxes in plaster ceilings shall have plaster covers. Fixture outlet boxes shall be equipped with fixture studs secured to the boxes.
- G. Outlet boxes for exposed work shall be 4" square by 1-1/2" deep, or larger. Boxes shall have Appleton 1/2" deep surface metal covers to accommodate the devices indicated, or approved equal.
- H. In walls or ceilings of concrete, tile or other non-combustible material, boxes and fittings shall be so installed that the front edge of the box or fitting will not set back of the finished surface more than 1/4". In walls or ceilings constructed of wood or other combustible material, outlet boxes and fittings shall be set flush with the finished surface.
- I. If a fixture, canopy or pan is used as an outlet box cover, any combustible wall or ceiling finish between the edge of the canopy and the outlet box shall be covered with non-combustible material.
- J. Fixture studs shall be installed in all fixture outlets. In each case, the maximum permissible number of conductors shall be reduced by one.
- K. Appropriate galvanized blank covers, subject to approval of the Architect, shall be installed over outlet or junction boxes which do not house a device. Multiple devices shall be installed in one-piece multi-gang box with one-piece multi-gang cover plates. On surface mounted switch and receptacle outlets, provide raised covers to permit mounting devices without additional device plates.
- L. For junction and pull boxes, 14 gauge or thicker sheetmetal. Attach covers by means of 1/4" X 20 round head machine screws. In damp locations, provide rubber or neoprene gaskets.
- M. Attention is called to National Electrical Code, Article 314, Paragraph 314-16, Sub-paragraph (a) and (b) relative to allowable number of conductors in outlet boxes. Contractor shall make provisions to prevent overcrowding outlet and junction boxes regardless of number of conductors shown on the drawings at the outlets. There shall be no deviations from Code requirements on this subject.

2.4 CONDUCTORS

- A. All conductors shall be copper and no wire shall be less than #12 AWG except as otherwise noted herein and or indicated on drawings.
- B. All conductors, except as herein noted and/or as indicated on drawings, shall have 600 volt insulation type THHN/THWN. Wiring through channels of continuous surface or suspended fluorescent fixtures shall be Type RHH, or THHN.
- C. Recessed fluorescent fixtures shall be fed with type THHN, or RHH conductors and recessed incandescent fixtures shall be fed with Type THHN conductors.
- E. D. Conductors #8 and larger shall be stranded. Feeders shall be of the size and type indicated on drawings. Color schedule as follows:

	<u>120/208</u>	<u>277/480</u>
Phase A	black	brown
Phase B	red	purple
Phase C	blue	yellow
Neutral	white/grey	grey/white
Ground	green	green

2.5 GROUNDING

- A. Grounding shall conform to the requirements of Article 250 of the N.E.C.
- B. Contractor shall provide grounding system indicated on drawings.
- C. The steel conduit systems and the neutral conductors of the wiring systems shall be grounded at the service equipment. The copper service ground conductors shall be extended in conduit from the services to as near as practicable to the point of entrance of the water service. Where the conduit routing is via finished areas, it shall be run concealed. Ground connection shall be visible, and connection of conduit and conductors to the water pipe shall be made with an approved ground connector, conduit hub, and water pipe clamp.
- D. A grounding conductor shall be provided in all conduit. The grounding conductor shall be green insulated, with a minimum size of #12 AWG, or as indicated on the drawings or per NEC-250. Grounding conductors routed entirely in soil as part of the ground loop shall be bare copper. The grounding conductor connecting the electrical service to the ground system shall be green insulated copper.
- E. The above requirements shall be supplemented by ground to ¾" diameter, 10'-0" long driven copper bonded ground rods as shown on the drawings.
- F. Bond jumpers shall be used around concentric or eccentric knockouts on service equipment.
- G. Grounding pole of each polarized receptacle shall be bonded to its outlet box with copper wire and machine or self-tapping screw.

2.6 EQUIPMENT SUPPORTS

All electrical switches, panels, appurtenances, etc., shall be rigidly supported on Unistrut, Kindorf or equal steel framing which shall be securely fastened to walls, floors, ceilings, etc., as required. Details of framing must be submitted to Architect for approval before installation.

2.7 WIRING DEVICES

- A. Devices shall be Specification Grade as manufactured by Leviton, Hubbell, P & S, or approved equal. Provide red colored receptacle where connected to emergency circuit. All emergency circuits shall be labeled on receptacle face plate.
- B. All devices listed below may not necessarily be used.
- C. Comparative catalog numbers of devices shall conform to the following: (All devices listed may not be used).
 - 1. Duplex receptacle, 20A, 125V, NEMA 5-20
 - Hubbell CR5362
 - Leviton 5362
 - P & S 5362

2. Duplex receptacle, GFI, 20A, 125V, NEMA 5-20
Hubbell GF5362
Leviton 6899
P & S 2091
3. USB Charger receptacle (use in fire station dorm rooms)
Leviton T5632
4. Toggle switch, 20A, 120-277V, SPST
Hubbell CS1221
Leviton 1221-2
P & S 20AC1
5. Toggle switch, 20A, 120-277V, DPST
Hubbell CS1222
Leviton 1222-2
P & S 20AC2
6. Toggle switch, 20A, 120-277V, 3-way
Hubbell CS1223
Leviton 1223-2
P & S 20AC3
7. Toggle switch, 20A, 120-277V, 4-way
Hubbell CS1224
Leviton 1224-2
P & S 20AC4
8. Toggle switch, 20A, 120-277V, pilot light
Hubbell HBL 1221 PL
Leviton 1221-7LI
P & S 20AC1-RPL
9. Incandescent dimmer switch, 120V, 1000W
Hubbell S11W
P&S LS1000PW
10. Fan switch, dual control fan and light switch to be supplied by same manufacturer as ceiling fan.
11. Occupancy sensor switch, 20A, 120-277V
See below
12. Duplex Weatherproof – GFI with WP cover.
13. Special Receptacles –
(250V, 2 pole, 3 wire, 50A) NEMA 6-50R
(250V, 2 pole, 3 wire, 30A) NEMA 6-30R
(250V, 2 pole, 3 wire, 20A) NEMA 6-20R
14. Floor Boxes – stamped steel, fully adjustable, shallow rectangular box with 2 compartments (1 for duplex receptacle and 1 for telecommunications), brass trim ring with duplex flap covers, Hubbell B2422/S3825. Provide carpet flanges where required.

- D. All receptacles shall be mounted with the grounding connection at the top. All receptacles shall be provided with child safety insulated inserts.

2.8 DEVICE PLATES

- A. Wall plates shall be of the one-piece type, .100" smooth nylon of color as determined by Architect. Plates shall be of the same manufacturer as devices furnished.
- B. Use Multi-gang plates where switches are grouped.
- C. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will NOT be permitted. Plates shall be installed with an alignment tolerance of 1/16" from the vertical or horizontal. Plates for devices fed with exposed conduit shall be as hereinbefore specified.
- D. Device plates shall not be installed until painting is completed. Device plates having paint on their surfaces, or having their finish marred by use of paint remover, shall be replaced at no additional cost to the Owner.
- E. Where device is located outdoors or specified as weatherproof, use cast aluminum box with cast aluminum cover listed for wet location when cover is closed (NEC 410-57(b) exception)

2.9 MOUNTING HEIGHTS

- A. If not otherwise indicated in Architectural or Electrical drawings, mounting heights to centerline of outlets shall be as follows:
- B. Receptacles - 18" above finished floor except above counter where indicated, or as directed by Owner.
- C. Light Switches - 48" above finished floor.
- D. Panelboard - Not more than 6'-0" from topmost operating handle to floor.
- E. Bracket Fixtures - 8'-0" above floor, or where mounted above exterior door, mirror, medicine cabinet, at a height just sufficient to clear the swing of the door or medicine cabinet.
- F. The above mounting heights may be adjusted as required to permit bottom or top of plate to align with mortar joints in unfinished masonry walls, provided joints are not raked. Where joints are raked, adjust height as required to insure that center of outlet box will be in center of a masonry unit.

2.10 PANELBOARDS

- A. Panelboards shall be constructed with copper or silver plated copper bus bars. Panelboard shall be fully rated (no series rating allowed) with a minimum rating for each panelboard as indicated on panel schedules on the drawings.
- B. See drawings for panelboard schedules. Provide 200% neutral bus where indicated. All panels shall have ground bus. Provide contactors where indicated on schedule.
- C. Panelboards shall be mounted in suitable electro-galvanized or sherardized, code-gauge, dead front, steel boxes with trim arranged for flush or surface mounting as indicated on drawings. Sufficient space shall be provided for not less than 4" gutters on the sides, top and bottom of panels. The doors shall be fitted with not less than two welded and riveted hinges,

- fitted with non-removal pins and provided with latches and locks with three (3) keys. Door and trim shall be properly matched and fitted closely by means of welded rebates on the sides of the trim and shall be finished to match surrounding walls or as otherwise directed by the Architect. Directory frame with typewritten directory of circuits under transparent cover shall be provided inside of door.
- D. Panelboards shall be so located that its rating will not be reduced by heat from external sources.
 - E. Circuit breakers shall be bolted to the bus bar, and be quick-make, quick-break, using over-center toggle mechanism. Breakers shall indicate tripped position by assuming the center toggle position. Breakers shall have deion arc extinguisher principle. All two and three-pole breakers shall have single handle and the common trip. No bail handle ties will be acceptable.
 - F. Panelboards shall be as shown in panelboard schedule and shall be manufactured by Square D (NQ series 240V, NF series 480V), Siemens P series or equal.
 - G. Provide factory TVSS with 100 kA surge capacity where indicated on the panel schedules.

2.11 SAFETY SWITCHES

- A. Safety switches shall be of the visible blade, heavy duty knife switch type. They shall be of the fused or unfused type as required. Fused switches shall have positive pressure fuse clips. Switches shall be fully interlocked with provision to neutralize the interlock by a screwdriver while under load without interrupting the circuit. Switches shall be complete with insulated base and pressure or solderless lugs. All switches shall be horsepower rated, capable of breaking stalled-rotor motor current at these ratings. Outdoor locations shall have NEMA Type 3R enclosures, indoor locations shall have NEMA 1 enclosures.
- B. Switches shall have provision for padlocking in the "ON" or "OFF" positions. Safety switches, as indicated on plans, shall be Square D - F series, Siemens H series or equal.

2.12 FUSES

Fuses utilized shall provide type 2 "no damage" as defined by IEC 947. All fuses shall have a minimum interrupting rating of 200,000 A. Fuses protecting transformers shall be Class J or RK5 time delay. Fuses protecting motor loads shall be Class J or RK1 current limiting. Provide one set of spare fuses for each load protected. Fuses shall be manufactured by Ferraz-Shawmut, Cooper Bussman, or approved equal.

2.13 TERMINATIONS

All termination lugs shall be rated 75 degrees C or higher, and shall be compatible with number and size of wires to be terminated.

2.14 LIGHTING CONTROL DEVICES

INDOOR OCCUPANCY SENSORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated to the Work include, but are not limited to, the following:

1. Leviton
 2. Hubbell
 3. Douglas Lighting Controls
 4. Watt Stopper (The).
- B. General Description:** Wall- or ceiling-mounting, solid-state units with a separate relay unit.
1. Operation: Unless otherwise indicated, sensors shall turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes. Sensors shall be capable of manual or automatic ON operation, and set for manual ON, automatic OFF.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit or room lighting controller.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box. Ceiling or wall mounted to suit application.
 - b. Relay: Externally mounted through a ½-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200fc (21.5 to 2152 lx); keep lighting off when selected lighting level is present.
 8. Finish and Coverplates: Lighting control devices shall match color of wiring devices. Coverplates shall be stainless steel to match that of wiring devices.
- C. Sensors:**
1. Dual-Technology Type: Ceiling or wall mounted to suit application; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operation controls on unit.
 - a. Sensitivity Adjustment: Separate for each sensing technology.
 - b. Detector Sensitivity: Detect occurrences of 6-inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. and detect a person of average size and weight moving not less than 12 inches in either a horizontal or vertical manner at an approximate speed of 12 inches/s.
 - c. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch high ceiling.
- C. Wall Switch Occupancy Sensors**
1. PIR (Infrared) Type: Wall mount, detect occupancy by sensing a combination of heat and movement in area of coverage.
 - a. Auto ON/Auto Off or Manual On/Auto OFF operation.
 - b. Impact resistant IR lens.
 - c. Dual relay where sensor controls multiple loads.
 - d. Dual 120/277 volt operation.
 - e. 1000 square foot, 180 degree coverage.
- D. Digital Time Switch:** Wall mount, digital time with LCD display and ON/OFF pushbutton. Timer programmable for 5, 10, 15, or 30 minutes or 1, 3, 6, 9, 12 hours. Provides flicker and/or beep warning at 2 and 1 minute intervals before a pending turn off. 120/277 volt operation.

- E. Room Lighting Controllers: Room lighting controllers shall have the following features:
 - 1. Plenum rated for mounting above accessible ceiling.
 - 2. Line voltage (120/277 volt) relays and 0-10 volt dimming outputs as required.
 - 3. Accept inputs such as occupancy sensors, low voltage switches and daylight sensors.
 - 4. Support energy saving manual ON, bi-level, tri-level and dimming control strategies.
 - 5. On/Off/Dim button for each load.
 - 6. Zero crossing circuitry for each relay for reliability and increased product life.
 - 7. Capable of Bacnet interface with building automation system.
- F. Digital Network Bridge: The network bridge shall provide connectivity between the lighting network and a BACnet compatible network. Network bridges shall be provided at all room lighting controllers to allow BACnet interface with building automation system. Network bridge shall be plenum rated and mount above accessible ceiling.
- G. Low Voltage Switch: Low voltage switches shall have the following features:
 - 1. Customizable buttons with LED status indicators. Switches shall be available in single and multiple button configurations to suit application.
 - 2. Active dim feature (raise/lower) to enable manual adjustment of any selected load.
 - 3. Communicates with room lighting controller or relay in lighting control panel with low voltage wiring to control load.
 - 4. Programmable scene presets.
 - 5. Switch shall fit in single gang box, and shall be capable of multi-way operation.
 - 6. Infrared transceiver for wireless configuration and control.
 - 7. Provide engraved legend for each button.

DIGITAL PHOTOCELL INPUT MODULE

- A. Description: Photocell module shall be an accessory to the lighting control panel and allow the system to read ambient light levels for use in controlling exterior lights. Module shall be compatible with lighting control panel, and mounted within control panel. Module shall include exterior photocell with the following features:
 - 1. Light-level Monitoring Range: 0 to 200 fc.
 - 2. 24 VDC from photocell module.
 - 3. Slew rate, one minute full scale response time.
 - 4. Mounting, 1/2" NPT x .69" threaded stem
 - 5. Housing, UV stabilized plastic.

END OF SECTION 260600

SECTION 263213 - EMERGENCY GENERATOR (Owner furnished contractor installed)

PART 1 - GENERAL

1.1 DESCRIPTION OF SYSTEM

- A. Provide a 100 kW natural gas fueled generator set to supply electrical power in event of failure of normal supply, consisting of liquid cooled engine, an AC alternator and system controls with all necessary accessories for a complete operating system, including but not limited to the items as specified hereinafter.

1.2. REQUIREMENTS OF REGULATORY AGENCIES

- A. An electric generating system, consisting of a prime mover, generator, governor, coupling and all controls, must have been tested, as a complete unit, on a representative engineering prototype model of the equipment to be sold.
- B. The transfer switches must be UL listed for use in emergency systems.
- C. The generator set must conform to applicable National Electrical Code and applicable inspection authorities and UL2200 listed.
- D. The generator set must be available with the Underwriters Laboratories listing as a stationary engine generator assembly.

1.3. MANUFACTURER'S QUALIFICATIONS

- A. This system shall be supplied by GENERAC or an approved equal who has been regularly engaged in the production of engine-alternator sets, automatic transfer switches, and associated controls for a minimum of five years, thereby identifying one source of supply and responsibility.
- B. To be classified as a manufacturer, the builder of the generator set must manufacture, at minimum, engines or alternators.
- C. The manufacturer shall have printed literature and brochures describing the standard series specified, not a one of a kind fabrication.

PART 2 - PRODUCTS

2.1 ENGINE

- A. The prime mover shall be a liquid cooled, natural gas engine of 4-cycle design. It shall each have an 10-cylinder block with a minimum displacement of 6.8 liters.
- B. The engine shall be cooled with a unit mounted radiator, fan, water pump, and closed coolant recovery system providing visual diagnostic means to determine if the system is operating with a normal engine coolant level. The radiator shall be designed for operation in 122 degrees Fahrenheit ambient temperature.
- C. The intake air filters, with replaceable element, shall be mounted on each unit. A positive displacement lube oil pump shall provide full pressure lubrication. The engine shall have a replaceable oil filter with internal bypass and replaceable elements. Engine coolant and oil

drain extensions shall be provided to outside of the mounting base for cleaner and more convenient engine servicing. These extensions shall be equipped with ball valves and plugs. A fan guard shall be installed for personnel safety.

- D. The engine shall have a battery charging DC alternator with a transistorized voltage regulator. Remote 2-wire starting shall be by a solenoid shift, electric starter.
- E. An electronic solid state governor shall control engine speed to maintain alternator frequency. The frequency tolerance shall be held within 0.5% from no load to full load alternator output. Steady state regulation is to be 0.25%.
- F. The engine fuel system shall be designed for operation on natural gas.
- G. Sensing elements to be located on the engine for low oil pressure shutdown, high coolant temperature shutdown, low coolant level shutdown, overspeed shutdown and overcrank shutdown. These sensors are to be connected to the control panel using a wiring harness with the following features: wire number labeling on each end of the wire run for easy identification, a molded rubber boot or sealed connector to cover the electrical connection on each sensor to prevent corrosion and all wiring to be run in flexible conduit for protection from the environment and any moving objects.
- H. Provide the following items installed at the factory:
 - 1. The manufacturer shall supply its recommended stainless steel, flexible connector to couple the engine exhaust manifold to the exhaust system.
 - 2. The engine shall have a unit mounted, thermostatically controlled water jacket heater to aid in quick starting. It will be of adequate wattage as recommended by the engine manufacturer. The contractor shall provide proper branch circuit from normal utility power source.

2.2 ALTERNATOR

- A. The alternator shall be a 4-pole revolving field type, 4 lead, wired for 120/208 VAC, three phase, 60 Hz rated at 100 kW with brushless, PMG exciters. The stators shall be direct connected to the engines to insure permanent alignment. The stator must be balanced in two planes. The generator shall meet temperature rise standards for Class "H" insulation. All leads must be extended into an AC connection panel. The alternator shall be protected by a main-line circuit breaker and an over excitation protection circuit integral to the voltage regulator.
- B. One step load acceptance shall be 100% of engine-generator set nameplate rating and meet the requirements of NFPA 110 paragraph 5-13.2.6. The generator set and regulator must sustain at least 90% of rated voltage for 10 seconds with 250% of rated load at near zero power factor connected to its terminals when equipped with direct or brushless excitation. 300% short circuit current must be selectable on units equipped with permanent magnet exciters. Generators equipped with permanent magnet exciters not allowing the selection of the short circuit current ratings are not allowed.
- C. A solid state digital voltage regulator designed and built by the engine-generator set manufacturer must be used to control output voltage by varying the exciter magnetic field to provide + or – 0.25 % regulation during stable load conditions, as well as reactive differential current- compensation between gensets. Should an extremely heavy load drop the output frequency, the regulator shall have an active engine unload (voltage reduction) algorithm. The engine unload algorithm shall reduce voltage at a rate greater than the standard volts per

hertz under-frequency protection. The regulator shall also support Volts per Hertz under-frequency protection.

- D. The voltage regulator must contain an overvoltage shutdown circuit to protect the generator and the loads from over-voltage conditions. This circuit shall activate by 115% of rated voltage for 0.75 seconds. On loss of the voltage-sensing signal, the voltage regulator must be capable of shutting down to prevent an overvoltage condition from occurring. This function must not inhibit the generator from supplying 300% short circuit fault current for 10 seconds.
- E. A NEMA 1 panel that is an integral part of the generator set must be provided to allow the installer a convenient location in which to make electrical output connections. The generator set manufacturer shall include an isolated neutral lug to insure proper sizing.
- F. The electric plant shall be mounted with vibration isolators on a welded steel base that shall permit suitable mounting to any level surface.
- G. A thermal-magnetic UL listed main line circuit breaker rated at 400 amps must be mounted in the AC connection panel. A system utilizing a manual-reset field circuit breaker and current transformers is unacceptable.
- H. Contact closure to the generator common bus shall be accomplished by an electrically operated (240vdc close, 24vdc trip) contact system located in the power distribution panel of the generator system that is accessible from the exterior of the unit. The contactor shall have mechanical lugs for load-side cable connections. The standard lugs shall accept up to 4 x 250 MCM to 350 MCM per phase.

2.3 CONTROLS

- A. The engine-generator set controller shall contain a complete automatic engine start-stop control where a digital signal from a remote transfer switch to the generator initiates the start and stop functions of the engine. A programmable cyclic cranking limiter shall be provided to open the starting circuit after the selected number of starting cycles, latching a shutdown fault. Engine control modules must be solid state plug-in type for high reliability and easy service. All engine alternator controls shall be designed, built, wired, tested and shock-mounted in a NEMA 1 enclosure to each engine-generator set by the manufacturer.
- B. The control panel shall have the following features:
 - 1. Auto/Manual/off key switch
 - 2. Alarm LED
 - 3. Not in Auto LED
 - 4. Alarm Acknowledge Button(on-screen)
 - 5. Audible Alarm
 - 6. Emergency Stop
- C. Each controller shall include a touch screen LCD interactive RS485 interface to CPU. The Human Machine Interface (HMI) unit shall have at least a 32bit processor operating at 66 MHz with a memory capacity of 128kB. The display shall be at least 5.7" with a resolution of 320 x 240. The operator interface shall provide a minimum of:
 - 1. 30 pages of information with 10 items per page
 - 2. Diagnostics through operator interface display or remotely via GenLink, Generac software.
 - 3. Display of required preventive maintenance intervals
- D. The touch screen shall display all pertinent unit parameters including:
 - 1. Generator Status Current; unit status in real time
 - 2. Engine operating conditions to include;
Real time readouts of the engine and alternator analog values

- Oil pressure and optional oil temperature
- Coolant temperature and level
- Fuel level (where applicable)
- Engine speed
- DC battery voltage
- Run time hours
- Generator voltages, amps, frequency
- Power factor
- 3. Generator Commands; Current engine start/stop status
- 4. Alarm Status to include;

- Current alarm(s) condition
- Low or high AC voltage
- Low or high battery voltage
- Low or high frequency
- Pre-low or low oil pressure
- Pre-high or high oil temperature (optional)
- Low water level and temperature
- Pre-high or high engine temperature
- High, low and critical low fuel levels (where applicable)
- Overcrank
- Over and under speed
- Unit not in "Automatic Mode"

- 5. Alarm Log; Memory of last twenty alarms with date and time stamps
- 6. Operating parameters; Access to and manipulation of the current operating parameters and alarm limits shall be via Generac GenLink software. The PC based software can be utilized for the standard RS232, RS485 or modem. The software must display the module face, be updated in real time and allow for complete access to all module functions.

2.4 AUTOMATIC TRANSFER SWITCH

- A. The automatic transfer switch(s) shall be Generac standard product or approved equal. Generac transfer switches are designed to interface directly with the generator permissive and load shed requirements. Included are the two-wire start output, terminals for the permissive/enable signals and trip-to-neutral function terminals. However, if third party transfer switches are used, they shall provide a two-wire start to the generator when a utility outage occurs. Additionally, third party switches shall be capable of being inhibited by the generator (prevented from switching load to emergency until permissive is invoked) permissive output, until adequate generator power is available. Ideally, if generator failure should occur during emergency operation, third party switches should be able shed load via trip to neutral feature. The advantage is the switch goes to a neutral position, the load is shed and does not re-close to utility that may have a fault present. The minimum alternate to that would be to shunt trip load breakers to shed enough non-essential load to prevent the system from shutting down. The disadvantage is the shunts have to be reset manually. Be sure to contact Generac engineering to discuss the details on the scope of the project and functionality of third party switches prior to finalizing any design specifications. ATS shall be rated 400 amps, 120/208 Vac, 4 pole switched neutral design. Nema 3R Enclosure.

2.5 ADDITIONAL UNIT REQUIREMENTS

- A. Each unit shall have equipment installed at the engine-generator set manufacturer's facility as hereinafter specified.
- B. Provide an automatic dual-rate battery charger manufactured by the engine-generator set supplier. The automatic equalizer system shall monitor and limit the charge current to 10 amps. The output voltage is to be determined by the charge current rate. The charger must

have a maximum open circuit voltage of 35 volts and be protected against a reverse polarity connection. The battery charger is to be factory installed on the generator set. Due to line voltage drop concerns, a battery charger mounted in the transfer switch will be unacceptable.

- C. A heavy duty, lead acid battery set shall be provided by the generator set manufacturer. The battery shall produce adequate voltage and amperage to start and operate the engine. Provide all inter-cell and connecting battery cables as required.
- D. A kit shall be furnished to provide a means for attaching a flexible coupling between the engine radiator and the building cooling air discharge duct.
- E. The engine-generator set shall be factory enclosed in a heavy gauge steel enclosure constructed with 12 gauge corner posts, uprights and headers. The roof shall aid in the runoff of water and include a drip edge. The enclosure shall be coated with electrostatically applied powder paint, baked and finished to manufacturer's specifications. The enclosure is to have large, hinged doors to allow access to the engine, alternator and control panel. The doors must lift off without the use of tools. Each door will have lockable hardware with identical keys. Padlocks do not meet this specification.
- F. Exhaust silencers shall be provided of the size as recommended by the manufacturer and shall be of critical grade. The silencers shall be mounted on the weather protective enclosure with solid brackets. It shall be connected to the engine with a flexible, seamless, stainless steel exhaust connection. A rain cap shall terminate the exhaust pipe. All components shall be properly sized to assure operation without excessive back pressure when installed.

2.6 FACTORY TESTING AND REPORTS

- A. Before shipment of the equipment, the engine-generator set shall be tested under rated load for performance and proper functioning of control and interfacing circuits. Tests shall include:
 - 1. Verifying all safety shutdowns are functioning properly.
 - 2. Single step load pick-up per NFPA 110-1996, Paragraph 5-13.2.6.
 - 3. Transient and voltage dip responses and steady state voltage and speed (frequency) checks.
 - 4. Perform an emergency standby event to assure the entire system operates as designed and intended.
 - 5. Verification that the generators start, synchronize and parallel with each other.

PART 3- EXECUTION

3.1 OWNER'S MANUALS

Three (3) sets of owner's manuals specific to the product supplied must accompany delivery of the equipment. General operating instruction, preventive maintenance, wiring diagrams, schematics and parts exploded views specific to this model must be included.

3.2 INSTALLATION

Contractor shall install the complete electrical generating system including all fuel connections in accordance with the manufacturer's recommendations as reviewed by the Engineer.

END OF SECTION 263213

SECTION 265000 - LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. All Drawings and General Provisions of the Contract, including General Conditions, Supplementary Conditions, and other Division 1 Specification Sections apply to this Section.
- B. Applicable items in all other Electrical Sections shall be included in this Section.

1.2 DESCRIPTION OF WORK

- A. Contractor shall furnish and install all lighting fixtures as shown in fixture schedule and at locations indicated on drawings. This includes all fixtures with lamps, necessary supports, etc., for a complete and safe installation, along with wiring and connections thereto. Where fixture model number and description differ, fixture description shall be followed.
- B. All recessed fixtures installed in plaster ceilings shall be furnished with metal plaster frames.
- C. Contractor shall advise General Contractor as to the exact location of all recessed fixtures so that ceiling construction and/or joist spacing may be coordinated as necessary to permit symmetrical positioning of fixture in each room.
- D. In acoustical tile ceilings, recessed fluorescent fixtures shall be installed so as to alleviate the necessity for cutting the tile.
- E. Trims of all recessed fixtures shall be installed in a neat and workmanlike manner so as to fit tightly and evenly against the surface of the ceiling. Adapters shall be installed to compensate for slope ceilings.
- F. For acoustical tile ceilings, surface fixtures shall be centered on a tile or a tile joint, unless noted otherwise.

PART 2 – PRODUCTS

2.1 BALLASTS

- A. Ballasts for operation of all fluorescent lamps shall be HPF Electronic with Class A Sound Rating.
- B. Fluorescent ballasts for operation of T8 rapid start lamps shall be electronic high-efficiency type with the following characteristics:
 - 1. Operate multiple lamps as parallel circuit, operating remaining lamps at full light output upon failure of other lamps connected to the same ballast.
 - 2. Operate at rated circuit voltage, at an input frequency of 60 Hz, and tolerate +/- 10% sustained voltage variation without damage to the ballast, and maintain light output at +/- 10% voltage variation.
 - 3. Comply with EMI and RFI limits set by the FCC (CRF 47 Part 18) for non-consumer applications and not interfere with normal electrical equipment.
 - 4. Power Factor shall be not less than 0.95.
 - 5. Total Harmonic Distortion shall be less than 10%.
 - 6. Lamp Crest Factor shall be 1.7 or less.

- 7. Withstand transients shall be as specified by ANSI C.62.41 for location category A.
 - 8. Shall comply with applicable ANSI standards.
 - 9. Shall be provided with a three (3) year warranty.
- C. Individual ballasts specifically designed and UL Listed are to operate one, two, three, or four lamps as scheduled on the drawings.
- D. Ballast Factor shall be greater than 0.85, and sound rating shall be "A".

2.2 LAMPS

- A. Lamps may operate in instant start mode, and shall operate at a frequency higher than 20 kHz.
- B. T8 fluorescent lamps shall be 46" long, miniature bi-pin, rapid start, 3500 K, 85 CRI, except where specifically noted otherwise.
- C. All H.I.D. lamps shall be phosphor coated, wattage as specified in the drawings.
- D. Where they are indicated, exit fixtures shall have LED lamps and shall have letters at least five (5") inches high on a metal stencil with a red translucent background. Exit fixtures shall be wall mounted (unless ceiling mounted is required for the particular location) above doors as shown on drawings, and shall be mounted such that viewing angles are maximized.

2.3 MANUFACTURERS

- A. Certain items in this Specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character, and quality of product desired. Similar items manufactured by other than those listed will be considered, providing submittals are made according to substitution requirements of the General Specifications. Where fixture description provided is in conflict with the model number provided, contractor shall provide a light fixture meeting the description, not the model number.
- B. See Lighting Fixture Schedule on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures to be installed in or on painted ceilings and/or walls shall not be installed until painting is completed. Fixtures installed with paint applied over factory finishes will be rejected.
- B. For any type ceiling which itself does not provide sufficient support for fixtures, support fixtures from structure above. Lay-in troffers in grid type ceilings shall be installed with at least 2 supports on diagonal corners.

END OF SECTION 265000

SECTION 270500 - TELECOMMUNICATION AND VIDEO DISTRIBUTION SYSTEMS

PART I - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary provisions and Division-1 Specification sections, apply to work of this section.

1.2 WORK INCLUDED

A. Furnish labor, materials, equipment, engineering, training, support, and services, and perform all operations to construct the telephone and data systems and conduit for the cable TV systems, described herein and as shown on the Drawings. This work includes but is not necessarily limited to the following:

1. Telephone System
2. Data System
3. Cable TV System

1.3 SUBMITTALS

A. Shop Drawings: Brochures shall be bound booklets containing manufacturer's catalog sheets encompassing information keyed to the procurement document for each item incorporated in the various systems. Quantity and type of devices required may differ from that shown on the Drawings, depending on manufacturer of product proposed and on actual site conditions. As soon as possible after award of Contract, submit for approval two copies of each of the following:

1. Wiring Diagrams: Provide complete point-to-point wiring diagrams for all systems and subsystems. Show all components in the communications path from the central control through all intervening system components, including terminal boards to the individual end devices. Document associated equipment required to complete a transmission path. The intent of this requirement is to provide a document that will permit end-to-end tracing of the system wire and cabling. Where conductors are grouped into a cable for long site runs, a single line properly identified should be shown. Where these cables fan out for termination, individual wire termination and markings shall be shown.
2. Equipment Locations: Provide drawings that show the elevations for every building, indicating exact locations of all equipment in the system, both new and existing.
3. Detail Drawings: These drawings shall indicate the accurate locations of all equipment associated with each system in respect to architectural and structural conditions. Drawings of components, equipment layouts, and other small-size areas shall be dimensioned to the common scale of 1/2" or 1" per foot. Drawings of larger areas shall be dimensioned to the common scale of 1/4" or 1/8" per foot. Drawings shall include explicit notes on the termination of all conductors and shields for each location. Architectural backgrounds shall be in accordance with the latest architectural drawings and shall be complete with elevations, sections, and details as required to depict the installation. If, upon preliminary submittal of drawings, there are corrections to be made, they shall be made to the drawings and resubmitted for approval without extra cost to the Owner. These drawings shall be approved prior to starting work. The decision of the Owner's representative shall be final on all items. These drawings and changes at completion of the work shall become a part of the Contract Documents.

4. Markings: Submit for approval wire marking, panel label, zone label, terminal strip numbering and terminal strip identification styles, and typical text.

1.4 RECORD DRAWINGS

- A. Project Record Drawings shall include all bid drawings and all submittals.
- B. The Contractor shall obtain and keep up-to-date and available to the User or its representative complete blue line prints of the project, clearly annotated with "as-built" data as the work is performed; and these drawings shall become part of the requirements for progress payments. This data shall include the following:
 1. Routing of signal wire and cables, including the designations assigned to each wire/cable and each terminal strip.
 2. Accurate location of all equipment installed under the specifications.
 3. A complete equipment list for each functional area.

1.5 AS-BUILT DRAWINGS

- A. As-builts shall be the record drawings reflecting all construction through closeout of the work. Drawings shall be transferred to a complete set of full-size, reproducible, front-reading mylars.
- B. Service Manuals: As a condition of acceptance of the work by the Owner, the Contractor shall supply three complete sets of record drawings showing the completed work as built, operating manuals and replacement parts lists on each piece of equipment provided, including custom-fabricated assemblies. This information shall be suitably indexed and bound in hardback binders permanently identified on the spine with the caption "SERVICE MANUALS - TELEPHONE AND DATA SYSTEMS".

1.6 SYSTEMS DESCRIPTION

- A. Telephone System, telephone/data station outlets, telephone backboards, connecting blocks with accessories, and associated hardware for bundling, racking, terminating, and cross-connecting the cables and wires where shown. Telephone premises distribution outlets and connector block will be Category 6-compliant. Station wiring will be Category 6-compliant. References EIA-TIA-568 Commercial Building telecommunications Wiring Standard, Bulletin TSB-36 (characteristics of high-performance unshielded twisted- pair cable), and Bulletin TSB-40 (specifications of transmission characteristics for connecting hardware to ensure compatibility with high-performance unshielded twisted-pair cable specified in TSB-36). Refer also to "C" below.
- B. Data System, comprised of relay racks, patch panels, telephone/data station outlets, ethernet trunk cables linking communications equipment/wiring room distribution frames, connecting blocks with accessories, and associated hardware for bundling, racking, terminating, and cross-connecting the cables and wires where shown. Data premises distribution system shall be Category 6-compliant in every respect. Refer to "C" below.
- C. Category 6 cables and connectors are characterized up to 250 MHz and are typically intended for emerging applications with transmission rates up to, and possibly beyond, 100 Mbps, 155ATM, 622ATM and gigabite ethernet.
- D. Video riser cable and video cabling to each video outlet.

1.7 CODES AND STANDARDS

- A. Building codes and ordinances for public-owned buildings, plus the publications listed below, form part of this document as a minimum requirement. Conform to more stringent requirements where specified herein.
1. FCC Rules and Standards (1972), Part 76, Subpart K.
 2. NBS 11-81, Safety Rules for the Installation and Maintenance of Electrical Supply and Communication Lines.
 3. NFPA 70 (1996), National Electric Code, Article 800 Communications Circuits.
 4. State and Local Codes.
 5. ANSI/EIA 310-C (R1981), Racks, Panels, and Associated Equipment.
 6. EIA-TIA-568, Commercial Building Telecommunications Wiring Standard.
 7. EIA-TIA-569, Commercial Building Standard for Telecommunications Pathways & Spaces.
 8. TSB-36, Technical Systems Bulletin Additional Cable Specifications for Unshielded Twisted Pair Cables.
 9. TSB-40, Additional Transmission Specifications for Unshielded Twisted-Pair Connecting Hardware.

1.8 CUTTING, PATCHING, AND REFINISHING

The Contractor shall perform all cutting, patching, and refinishing attendant to his work. Contractor shall not cut any structural member without the written approval of the Architect. All patching and refinishing shall match the original work to the satisfaction of the Architect.

1.9 BASIC DESIGN

This Document indicates extent and general arrangement of a system with specific operational requirements. Product size, system components, quantity of cable, and the like required to accomplish these requirements, may vary under actual conditions. It shall be the Contractor's responsibility to verify the correctness of his parts list and equipment model numbers for conformance of each component with manufacturer's specifications, for use of equipment specified in the manner specified, and for conditions as they actually exist on the job site. Equipment not mentioned herein or shown on the Drawing(s), but necessary to meet this requirement, shall be provided without claim for additional payment. These items shall be included on the Contractor/Supplier's initial submittal.

1.10 EQUIPMENT COMPATIBILITY AND COMPLETENESS

While certain equipment items may by themselves meet the equipment specifications, and in fact meet the system specifications when electrically associated with other equipment, the system shall be designed so that the combination of equipment actually employed does not produce any undesirable effects such as signal distortions, noise pulses, glitches, hum bars, transients, RFI, EMI, etc. All such equipment required for compatibility and completeness, whether or not specified, shall be furnished and installed.

1.11 CHANGES IN LOCATION

The Architect reserves the right, before rough-in, to make reasonable changes in the equipment locations indicated without incurring additional cost.

1.12 DISCREPANCIES

Should there be a discrepancy between the Drawings and the Specifications, bring this to the written attention of the Architect at least seven days prior to bid date. Upon failure to do so, Contractor shall accept interpretation of the Architect.

1.13 CONFLICTS

In the event that conflicts occur necessitating departure from Drawings, submit report as soon as practicable for review by Architect. Conflicts shall include hazards and interference by structure or other equipment which preclude the intended installation, operation, and access of the work, in whole or in part. Do not proceed without consent of the Architect.

1.14 PRODUCT STANDARDS

Materials specified by reference to the number, symbol, or title of a specific Standard, such as a commercial standard, a Federal specification, trade association standard, or other similar standard, shall comply with the requirements in the latest revision thereof and any amendments or supplements thereto in effect on the date of Invitation for Bids, except as limited by type, class, or grade, or modified in such reference.

1.15 MANUFACTURER QUALIFICATION

Firm must be engaged in manufacturing a complete line of telephone and/or data products which meet applicable requirements of this section and which essentially duplicate products that have been in satisfactory local use not less than three years in similar service.

1.16 CONTRACTOR QUALIFICATIONS

The firm of its principals shall have a minimum of three years experience in the fabrication and installation of equipment similar to that proposed, and shall, if requested, be able to refer to similar installations now rendering satisfactory service. Firm must have installation and service facilities domiciled within 100-mile radius of project. Offerer's facilities shall be available for inspection by Architect.

1.17 CURRENCY OF EQUIPMENT

Notwithstanding the equipment described herein, Contractor shall supply the latest, most recent version of equipment available as of the date specified for bid opening. All equipment furnished shall be new and unused except Owner-furnished existing equipment marked for reuse.

1.18 WARRANTY

- A. For a period of at least one year following acceptance of the work, the Contractor shall, at no additional cost to the Owner, correct any defects arising out of design faults, defective materials, and defective workmanship. When warranty repairs cannot be made within 48 hours of a service request, the Contractor shall make available to the warrantee loaner equipment that will provide comparable service to that intended in this Document. Damage due to misuse, abuse, negligence, or other causes outside the control of the Contractor is excluded from warranty.
- B. Any guarantees and warranties by the manufacturer(s) extending beyond the one-year warranty period shall be turned over to the warrantee.

1.19 INSTRUCTION

As a condition of acceptance of the work by the Architect, the Contractor shall provide a minimum of two days of instruction for the benefit of designated representatives of the Owner. This instruction shall be conducted by personnel familiar with the installation, knowledgeable of the

system, and experienced in instruction. Coordinate the instruction of the Owner with the Architect.

1.20 COLOR AND FINISH

Color and finish selections will be made by the reviewer of submittals on those equipment items where "color to be selected" is indicated. Include the manufacturer's standard color chips with submittals. The equipment item's description in the submittal's bill of materials shall include blank space for the reviewer to insert his color and finish selections. The exclusion of color chips from a submittal may be cause for its rejection. Where the colors and finishes offered conflict with adjacent equipment and/or room finishes, the reviewer may select either from Federal Standard No. 595A Matching Colors or from manufacturer's standard colors, i.e., Altec green, IBM blue, etc. Color matches shall be within one NBS unit of measure.

PART 2 - PRODUCTS

2.1 WIRE AND CABLE TYPES

- A. From 110 wiring blocks to voice jacks: No. 23 AWG solid, 4-pair plenum rated unshielded twisted pair, polypropylene insulation and PVC jacket. Cable shall be Category 6 – compliant with a nominal capacitance of 15.0 pF/ft at 1000 Hz rated to each voice jack. Cable shall be Commscope Ultra Media #7504 or Belden Data Twist 6 (Part #7882A) with grey sheath.
- B. From patch panels to data jacks: No. 23 AWG solid, 4-pair plenum rated unshielded twisted pair, polypropylene insulation and PVC jacket. Cable shall be Category 6 – compliant with a nominal capacitance of 15 pF/ft at 1000 Hz routed to each voice jack. Cable shall be Commscope Ultra Media #7504 or Belden Data Twist 6 (Part #7882A) with a green sheath.
- C. Video cable: Coaxial cable shall be RG6U with 100% mylar-aluminum shielding and drain wire. Provide fittings manufactured for RG6U cable.

2.2 TELEPHONE, DATA AND VIDEO JACK PLATES

Two-port voice and data jacks (cat 6) shall be Ortronics OR-S22600 or Siemon MX6-02.

Video jacks shall be standard wall jack with F connector, Ortronics OR-21600 or Leviton 80781.

Individual ports will be identified by use with Ortronics or Siemons tab-insert jack markers according to the following color scheme: white for voice port, grey for data port A and blue for data port B. Station outlets shall use Ortronics OR-40300011 Series II or Siemon MX-FP-S-06-02 face plates.

2.3 VOICE TERMINATION BLOCKS

Voice termination blocks shall be rack mounted 100 pr #110 termination blocks.

2.4 WIRE MARKERS

Wire markers, when applied to their host cables, shall be non-contaminating, non-migratory, and permanent in its intended service and environment.

2.5 I.D. PLACARDS

Coordinate selection of placard stock (phenolic, acrylic, brass, etc.), placard style and color, and caption size and style. Engrave captions on selected stock. Machine-bevel edges of placard, and provide means for permanently attaching placard to equipment.

2.6 INSTALLATION HARDWARE

Installation hardware shall be as required by installation conditions, unless otherwise called for. All clamps, fittings, screws, nuts, washers, hooks, chains, shackles, and related installation hardware shall be electro-galvanized finished. All channels, brackets, hangars, and related materials shall be pre-galvanized with zinc weighing not less than 1.25 oz. per square foot of material.

2.7 GROUNDING

Provide a telecommunications grounding bus-bar in each of the telecommunications equipment rooms. The bus bar shall be grounded in accordance with EIA/TIA-607 standards and NEC required recommendations.

- A. Grounding shall conform to ANSI-J-STD 607(A) - Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code® (2005), ANSI/NECA/BICSI-568-2006 and manufacturer's grounding requirements as minimum.
- B. Bond and ground equipment racks, housings, messenger cables, and raceways.
- C. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system via #6 AWG green insulated copper grounding conductor
 - 1. Telecommunication grounding must be isolated from other grounds.
 - a. The grounding connection shall not be made to electrical conduits, power distribution box grounds or neutral busses.

2.8 SURGE/LIGHTNING PROTECTORS

Provide lightning protectors and wiring blocks for incoming cable. Provide ground wires to ground tel/data equipment. Provide AT&T #188ECA1-100G Building Entrance Protector with 4C-S; Solid State, Series Protector Units number required to protect 150-pair cable.

2.9 PATCH PANELS/PATCH CORDS

- A. All data station cabling and wireless access point cabling shall terminate on rack mounted 24-port or 48-port patch panels. Panels shall be 19" rack mounted and capable of accepting a variety of snap in inserts such as RJ-45 Category 6 modules for UTP, Fiber Optic inserts and Audio/Video inserts.
- B. Panduit Patch Panel part number or prior approved equal
 - a. 24-port - CPPL24WBLY
 - b. 48-port - CPPL48WBLY

- 1) NOTE: Snap-in modules for Voice and Data shall be color coded to match the corresponding WAO. See Section 2.8 for WAO colors.

C. Panduit Patch Cord Part number or approved equal

- a. UTPSP7BUY (7ft)
- b. UTPSP14BUY (14ft)

2.10 CABINETS

- A. Wall mounted cabinets will be used in classrooms.
- B. Wall mounted cabinets will be 19" rack mountable, 2 pair of 12-24 EIA/TIA tapped rails, swing out, 32" high. Cabinets shall be suitable for front mounting of patch panels and/or owner furnished switches.
- C. Hubbell part number RE4B or prior approved equal:
- D. Furnish and install Panduit Tack-Tape, Velcro or approved equal cable wraps for wire management. **Plastic, nylon or metal tie wraps are not allowed.**

2.11 POWER STRIPS

- A. For mounting in the rack, with 20-A, 120V AC, 1U
 - 1) 10 Outlet NEMA 5-20
 - 2) 12ft Power Cable.
 - 3) Color Black
 - 4) APC Part Number: AP9563 or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. The fabrication and installation of all work shall be neat. All wire shall be marked and all equipment permanently identified. See "Wire Markers" and "I.D. Placards" under "Product" Section. All boxes, equipment, etc., shall be plumb and square.
- B. Furnish and install all necessary cable/associated equipment and hardware, and make-up all connections for a complete end-to-end cable/wire system.

3.2 SAFETY FACTOR

All equipment requiring installation under this Contract shall be permanently held in place. Fastenings and supports shall be adequate to support their loads with a safety factor of at least

three. Similarly, reinforce walls and provide backup load distribution plates as required to assure a safety factor of at least three in the installation of wall-mounted equipment.

3.3 ASSEMBLY AND INSTALLATION MATERIALS

Provide and install all materials and equipment required for proper installation and operation of system in order to obtain performance specified herein.

3.4 INSTALLATION OF CABLES

- A. Install cable without kinks, sharp bends, or deformations, in such a manner as to prevent abrasion. Do not install cable which shows bruises or shipping damages. Install cable in continuous lengths except for terminations at jack plates or IDF. Do not splice. Do not install connectors in raceways or in any inaccessible locations.
- B. Cables shall be installed in conduit. Cables shall not be routed within 12" of any light fixture or any type of power supply.
- C. Terminate cables designated for use by telephone on the respective telephone patch panels. Terminate cables designated for use by Data Systems in the respective data patch panel.

3.5 CABLE/WALL PLATE IDENTIFICATION SCHEME

- A. Apply wire markers specified under Product section to both ends of all cable/wire. Identification shall be the same at both ends, and duplication of a code for unrelated circuits shall not occur within the same terminal area.
- B. Each telephone cable pair shall be plainly marked at its backboard end on the terminal blocks.
- C. Each data cable shall be plainly marked at the patch panel on the patch panel designation strip(s).
- D. The outlet end shall be permanently identified on the back side of each outlet connector. Each connector outlet designation shall be identified on the floor plans as part of the as-built drawing.

3.6 CABLE TEST

- A. Before the Contract shall be considered complete, the Contractor shall conduct cable test on each telephone and data station cable. Employ LANcat System 6 or equivalent test equipment to verify Category 6 250-mHz performance. Test shall include attenuation, near end crosstalk, length, mutual capacitance, and characteristic impedance. Provide printout of test results to the Architect for each cable prior to the final acceptance inspection. Printouts shall be neatly bound. Each printout sheet shall clearly identify the cable under test. Cables not meeting published Category 6 performance standards shall be replaced with new and retested.
- B. Test each pair of the telephone voice riser cable for shorts between conductors, between conductors to shield, and between conductors to ground. Provide report of same to Architect prior to final inspection.

END OF SECTION 270500

SECTION 283000 - FIRE ALARM SYSTEM

PART 1 – GENERAL

1.1 SCOPE:

- A. This specification describes a Fire Detection and Alarm system. The control panel, shall be intelligent device addressable, analog detecting, low voltage and modular, with digital communication techniques, in full compliance with all applicable codes and standards. The features and capacities described in this specification are required as a minimum for this project and shall be furnished and installed by the Contractor.
- B. The system shall be in full compliance with National and Local Codes.
- C. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein.
- D. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years.
- E. The system as specified shall be supplied, installed, tested and approved by the Local Authority Having Jurisdiction, and turned over to the owner in an operational condition.
- F. The layouts shown on the drawings are schematic in nature. Exact system layout shall conform to NFPA-72 and the Contractor shall include all required wiring and devices in his bid.

1.2 RELATED WORK:

The following Sections of the Specifications shall apply to this work:

Division 1	Bidding Requirements and Conditions Of The Contract.
Division 26	Section 260500 Electrical Material & Methods.
Division 21	Section 211300 Fire Suppression System.

1.3 STANDARDS & CODES:

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the Authority Having Jurisdiction has adopted an earlier version.
- B. National Fire Protection Association (NFPA) Most current or approved Standard
 1. NFPA 13 Standard For The Installation of Sprinkler Systems.
 2. NFPA 13A Recommended Practice For The Inspection, Testing And Maintenance of Sprinkler Systems.
 3. NFPA 70 National Electrical Code.
 4. NFPA 72 National Fire Alarm Code.
 5. NFPA 90A Standard For The Installation of Air Conditioning And Ventilating Systems.
 6. NFPA 101 Life Safety Code.
- C. Underwriters' Laboratories, Inc. (UL) Appropriate "UL" equipment standards.
 1. "UL" 864 Control Panels.

2. "UL" 268 Smoke Detectors.
 3. "UL" 268A Smoke Detectors (HVAC).
 4. "UL" 464 Audible Signal Appliances.
 5. "UL" 1971, Standard for Visual Signaling Appliances.
- D. Building Codes
1. Standard Building Code and the Standard Fire Code.
 2. Uniform Building Code and the Uniform Fire Code.
 3. International Building Code and the International Fire Code.
 4. NFPA 5000 Building Code.
 5. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction.
 6. ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

1.4 QUALIFICATIONS OF INSTALLERS

- A. Before commencing work, submit data showing that the manufacturer has successfully installed fire alarm systems of the same scope, type and design as specified.
- B. The contractor shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction. Contractor shall be licensed by the State of Louisiana Fire Marshall as a Fire Alarm Contactor.
- C. Provide the services of a factory trained and certified representative or technician, experienced in the installation and operation of the type of system provided. The representative shall be licensed in the State if required by law. The technician shall supervise installation, software documentation, adjustment, preliminary testing, final testing and certification of the system. The technician shall provide the required instruction to the owner's personnel in the system operation and maintenance.

1.5 SUBMITTALS

- A. The contractor shall include the following information in the equipment submittals:
 1. Power calculations. Battery capacity calculations. Battery size shall be a minimum of 125% of the calculated requirement.
 2. Supervisory power requirements for all equipment.
 3. Alarm power requirements for all equipment.
 4. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst-case condition plus 25% spare capacity.
 5. Voltage drop calculations for Notification circuit wiring runs demonstrating worst-case condition.
 6. NAC circuit design shall incorporate a 15% spare capacity for future expansion.
 7. Submit manufacturer's requirements for testing Device Loop Card circuits and device addresses prior to connecting to control panel.
 8. Complete manufacturers catalog data including supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.
 9. Complete drawings covering the following shall be submitted by the contractor for the proposed system:
 - a) Floor plans in a CAD compatible format showing all equipment and raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code used.
 - b) Provide a fire alarm system function matrix as referenced by NFPA 72. Matrix shall illustrate alarm input/out events in association with initiation devices. Matrix summary shall include system supervisory and trouble output functions. Include any and all departures, exceptions, variances or substitutions from these specifications and/or drawings at time of bid.

10. Incomplete submittals shall be returned without review.
11. Contractor shall provide all documents required by the State Fire Marshal to review. Documents shall include all calculations and data necessary. These documents shall be sent to the Architect for his forwarding to the State Fire Marshal. This Contractor shall pay all fees associated with the Fire Marshal submittal. No work shall be done until the submittal is approved and returned from the Fire Marshal.

1.6 SYSTEM REQUIREMENTS

- A. The system shall be a complete, electrically supervised fire detection and notification system, microprocessor based operating system having the following; capabilities, features and capacities:
 1. Single addressable loop
 2. 252 addressable initiation device capability as a minimum.
 3. Each address shall be capable of supporting one input and one out put, for a total of 504 programmable points on a single loop.
 4. Addressable devices shall be polarity insensitive.
 5. Addressable devices shall operate on "standard wire" no special twist or shield shall be required
 6. 4 notification circuits capable of Style Y (Class B), or 2 notification circuits capable of Style Z (Class A).
 7. Optional relays or LED drivers for graphic annunciation.
 8. Optional Remote annunciator/control panel.
 9. Optional DACT capable of sending point information to a Central Station depending on protocol required by the Central Station.
 10. 80-character backlit LCD display with 40 character Customer defined message.
 11. Be programmable from system keypad or Laptop computer.

1.7 SYSTEM OPERATION

- A. Activation smoke detector or sprinkler water flow switch shall activate the building notification appliances.
- B. Activation of any alarm causing devices shall signal the Central Station to an alarm condition, if the DACT is installed
- C. Activation of a supervisory device shall sound an audible and light LED at the control panel to signal a supervisory condition.
- D. Activation of a supervisory causing device shall signal the Central Station to a supervisory condition, if the DACT is installed
- E. Activation of a trouble shall sound an audible and light an LED at the control panel to signal a trouble condition.
- F. Activation of a trouble shall signal the Central Station to a trouble condition, if the DACT is installed.

PART 2 – PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL:

- A. The FACP shall be a Fire-Lite Model MS-25 or equal and shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: HFS or equivalent Fire•Lite intelligent addressable smoke and HFS or equivalent Fire•Lite thermal (heat) detectors, HFS or equivalent Fire•Lite addressable modules, annunciators, Digital Dialer and Ethernet Communicators and other system controlled devices. Ethernet communications shall be via a Fire-Lite Model IPDACT. Central station supervisory equipment shall be a Teldat Corporation Visoralarm-Plus 2U listed to UL-864 standards.

B. Operator Control

1. Acknowledge Switch:

- a. Activation of the control panel Acknowledge switch in response to new alarms, supervisory and/or troubles shall silence the local panel piezo electric signal and change the alarm, supervisory and trouble LEDs to steady-ON mode.
- b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

2. Alarm Silence Switch:

Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

3. Alarm Activate (Drill) Switch:

The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is reset.

4. System Reset Switch:

Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

5. Lamp Test:

The System RESET switch shall also function as a Lamp Test switch and shall activate all system LEDs and light each segment of the display.

C. System Capacity and General Operation

1. The control panel shall provide, or be capable of, expansion to 25 intelligent/addressable devices of any type, detector or module
2. The control panel shall include two Form-C programmable relays, which can be used for Alarm, and Supervisory and a fixed Trouble relay rated at a minimum of 2.5 amps @ 24 VDC. It shall also include 2 programmable Notification Appliance Circuits (NACs) capable of being wired as NFPA Style Y (Class B). Either programmable Notification circuit shall also be capable of providing auxiliary power when programmed as such.
3. The control panel must have a built in annunciator with three characters of display each consisting of seven segments and feature LED's for AC, General Trouble, Silenced, Ground Fault, Low Battery, Walk Test, NAC 1 and 2 Active and Trouble, and Zones 1 through 5 Alarm, Supervisory, and Trouble. All control and programming keys are a membrane style buttons. The annunciator must be able to silence and reset alarms by opening the cabinet door and pressing SILENCE or RESET once. The annunciators must have an installer code that will allow the limitation of operating system programming to authorized individuals.

3. Modifications to the default panel program can only be accomplished using the embedded web server of the control panel. There are two ways to connect to the panel: connected to an existing network with a DHCP Dynamic Host Configuration Protocol server present or, plugged in directly to a PC using a standard CAT5e Ethernet cable.
5. The system shall allow the programming of any input to activate any output.
6. The FACP shall provide the following features:
 - a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
 - b. Detector sensitivity test, meeting requirements of NFPA 72, Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
 - c. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification an excessive number of times.
 - d. Periodic detector test, conducted automatically by the software.
 - e. Walk test mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for three seconds. The FACP will then automatically perform a reset and confirm normal device operation.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art; it shall communicate with, monitor and control all external interfaces. It shall include non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The microprocessor shall contain and execute all specific actions to be taken in the condition of an alarm. Control programming shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
3. An auto-programming capability (JumpStart) shall be provided to quickly identify devices connected on the SLC and make the system operational.

E. Display

1. The display shall provide all the controls and indicators used by the system operator.
2. The display shall include status information for all intelligent detectors, addressable modules and zones.
3. The display shall contain dedicated LEDs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE and GROUND FAULT, LOW BATTERY, WALKTEST, , , conditions.
4. The keypad shall be part of the standard system and have the capability to command all system functions. Installer password level shall be provided to prevent unauthorized system control or programming.
5. The display shall include the following operator control switches:

ACKNOWLEDGE, ALARM SILENCE, DRILL (alarm activate), ALARM ID, SUPERVS ID, TROUBLE ID and SYSTEM RESET.

F. Signaling Line Circuit (SLC)

1. The SLC interface shall provide power to and communicate with up to 25 devices of any type including: intelligent detectors (photoelectric or thermal) addressable pull stations, intelligent modules (monitor control). Each SLC shall be capable of NFPA 72 Style 4 (Class B) wiring.
2. The CPU shall receive information from all intelligent detectors to be processed to determine whether normal, alarm or trouble conditions exist for each detector. The software shall automatically compensate for the accumulation of dust in each detector up to allowable limits. The information shall also be used for automatic detector testing and for the determination of detector maintenance conditions.
3. The detector software shall meet NFPA 72, requirements and be certified by UL as a calibrated sensitivity test instrument.

G. The control panel will have the capability of Reverse Polarity Transmission or connection to a Municipal Box for compliance with applicable NFPA standards.

H. Digital Alarm Communicator Transmitter (DACT). The on board DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station. When the optional IPDACT Ethernet module is connected to the on board DACT, the system shall be capable of transmitting contact ID formatted alarms to a central station equipped with a compatible IP receiver via Ethernet over a private or public WAN/LAN, Intranet or Ethernet

1. Communication shall include vital system status such as:

- Independent Zone (Alarm, trouble, non-alarm, supervisory)
- AC (Mains) Power Loss
- Low Battery and Earth Fault
- System Off Normal
- 12 and 24 Hour Test Signal
- Abnormal Test Signal (per UL requirements)

2. The DACT shall support independent zone reporting via the Contact ID format. In this format, the DACT shall support the transmission of zones within the system. This format shall enable the central station to have exact details concerning the location of the fire for emergency response.

I. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's standard finish.
2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall provide for the viewing of all indicators.

J. Field Charging Power Supply:

The FCPS is a device designed for use as either a remote 24-volt power supply or as a booster for powering Notification Appliances.

1. The FCPS shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 18.0 amp hour batteries.
2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a control relay. Four NAC outputs, wired NFPA Style Y, shall be available for connection to the Notification devices.
3. The FCPS shall optionally provide synchronization of all connected strobes or horn strobe combinations when System Sensor, Wheelock or Gentex devices are installed.
4. The FCPS shall function as a sync follower as well as a sync generator.
5. The FCPS shall include a surface mount backbox.
6. The Field Charging Power Supply shall include the ability to delay the reporting of an AC fail condition per NFPA requirements.
7. The FCPS shall provide 24 VDC regulated and power-limited circuitry per UL standards. Should this be updated to latest UL standard?

K. Power Supply:

1. The main power supply for the fire alarm control panel shall provide up to 2.0 amps of available power for the control panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.
4. The main power supply shall continuously monitor all field wires for earth ground conditions.
5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

L. Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
3. Electronic sounders shall be flush or surface mounted as shown on plans.

M. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet

the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.
2. Strobe intensity shall meet the requirements of UL 1971.
3. The flash rate shall meet the requirements of UL 1971.

N. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of Section A listed above for audibility.
2. Shall meet the requirements of Section B listed above for visibility.

O. Specific System Operations

1. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 250 seconds.
2. Zone Disable: Any addressable device in the system may be enabled or disabled through the system keypad.
3. Zone Read: The system shall be able to display the following point status:
 - a. Alarm ID
 - b. Supervisory ID
 - c. Trouble ID
4. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
5. The fire alarm control panel shall include Silent and Audible Walk Test functions – Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system. The operation shall be as follows:
 - a. Alarming an initiating device shall activate programmed outputs, which are selected to participate in Walk Test.
6. Supervisory Operation: An alarm from a supervisory device shall cause the appropriate indication on the control panel display, light a Zone supervisory LED.
7. Signal Silence Operation: The FACP shall have the ability to program each output circuit (notification circuit or relay) to deactivate upon depression of the Signal Silence switch.

2.2 ADDRESSABLE INITIATION DEVICES

- A. Smoke detectors shall be an intelligent photoelectric detector with thermal element that provides digital communications to the FACP. Detectors shall be listed for use as open area protective coverage, in duct installation and duct sampling assembly installation and shall be insensitive to air velocity changes. Detectors shall be programmable as application specific, selected in software for a minimum of eleven environmental fire

profiles unique to the installed location. These fire profiles shall eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay, or LED remote indicator. The detector shall not exceed 2.5 inches of extension below the finish ceiling. Detector wiring shall not require any special cable. Provide (10) ten additional detectors where directed by Engineer. Include approximately 25 feet of wiring, conduit and fittings for each detector.

- B. The addressable thermal detector shall be a rate of rise detector rated at 135F.
- C. The addressable detector shall be a photo only detector that uses the light scattering principle with a supervised light source and receiver.
- D. Detector bases shall be low profile twist lock type with screw clamp terminals and self-wiping contacts. Bases shall be installed on an industry standard, 4" square or octagonal electrical outlet box. Bases shall be supplied with the following features as required for performance to this specification. Select the following bases as required for design operation;
 - 1. Standard detector base.
 - 2. Detector relay base with software programmed addressable relay integral to the base.
 - 3. Detector audible base with software programmed operation of the base audible.
- E. Duct Detector, Intelligent shall use one of the photoelectric detectors listed above for the sampling.
 - 1. The duct detector shall be capable of multi colored LED remote indicator light.
 - 2. The detector shall be supplied with the appropriate sampling tubes to fit the duct shall be monitored.
 - 3. Where indicated on drawings provide duct detector with remote relay that shall be operated from the control panel.
- F. The manual pull station shall be addressable and semi flush mounted. Where surface mounted is required supply the manufacturers surface mount box. Supply either of the following;
 - 1. A single action pull station.
 - 2. A double action pull station.
- G. Furnish and install, for the monitoring of contact type initiation devices and for the control of electrical devices where required, intelligent analog signaling circuit interface module. Modules shall be supplied to meet the project requirements as follows:
 - 1. A single circuit intelligent signaling circuit interface module for monitoring alarm, trouble, supervisory or status contact type devices.
 - 2. The single circuit interface shall also be available as a freestanding shrink-wrapped unit with pigtail wire leads for direct mounting with contact devices.
 - 3. A single circuit intelligent signaling circuit interface module for monitoring alarm, trouble, supervisory security or status contact type devices with form C software programmable control contacts for the management of specified electrical loads as required by this specification.
 - 4. Dual circuit intelligent signaling circuit interface module for monitoring alarm, trouble, supervisory security or status contact type devices.

2.3 ADDITIONAL DEVICES

1. Waterflow Indicators

- a. Waterflow switches shall be an integral, mechanical, non-coded, non-accumulative type. Coordinate sprinkler system requirements with Division 15.
- b. Waterflow switches shall have an alarm transmission delay time adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
- c. Waterflow switches shall be provided and connected under this section but installed under Division 15.

2. Sprinkler and Standpipe Valve Supervisory Switches

- a. Each sprinkler system water supply control valve riser, zone control valve and standpipe system riser control valve shall be equipped with a supervisory switch. Coordinate sprinkler system requirements with Division 15. As a minimum, each floor, the Atrium and the theater shall be zoned separately.
- b. Main gate valves shall be equipped with a supervisory switch.
- c. Supervisory switches shall be provided and connected under this section but installed under Division 15.

3. Addressable Modules

- a. Addressable monitor modules shall be provided to connect supervised zones to fire alarm control panel SLC loops. There shall be one monitor module for each supervisory switch or alarm switch. Fire pump shall be monitored in accordance with NFPA 72.
- b. Addressable control modules shall be provided to supervise and control operation of addressable control points. There shall be one control module for each control point. For fan shutdown, damper closure and other auxiliary control functions, the control module may be set to operate as a dry contact relay.

4. 120V Smoke Detectors

- a. Smoke detectors shall be 120V with combination horn sounder and visible strobe. The detectors shall be looped together for synchronized alarm.

2.4 INTERFACE WITH OTHER BUILDING SAFETY SYSTEMS

- A. HVAC and fans shall shutdown when either the duct detector for that unit is alarmed or when any device of the fire alarm system is activated. The FACP and remote annunciator shall be programmed with buttons for manual operation of each air-handling unit and smoke control fan.
- B. Sprinkler monitoring shall include waterflow switches and supervisory switches. Coordinate with Section 211300 requirements to interconnect all monitored points with the fire alarm system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform work in accordance with the requirements of NFPA 70, NFPA 72.
- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
- C. All cable runs shall be run parallel or at right angles to building walls, supported from structure at intervals not exceeding 3 feet and where installed in environmental air plenums, be rated for such use and tied/supported by components listed for environmental air plenums installation.

3.2 BOXES, ENCLOSURES AND WIRING DEVICES

- A. Boxes shall be installed plumb and firmly in position.
- B. Extension rings with blank covers shall be installed on junction boxes where required.
- C. Junction boxes served by concealed conduit shall be flush mounted.
- D. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
- E. "Fire alarm system" decal or silk-screened label shall be applied to all junction box covers.

3.3 CONDUCTORS

- A. Each conductor shall be identified, as shown on the submittal drawings, with wire markers at terminal points. Attach permanent wire markers within 2 inches of the wire termination. Marker legends shall be visible.
- B. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.
- C. Wiring for Notification Appliance circuits shall be a minimum 14 AWG
- D. All splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer recommendations.
- E. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- F. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.
- G. A consistent color code for fire alarm system conductors throughout the installation.
- H. The installation contractor shall submit for approval prior to installation of wire, a proposed color code for system conductors to allow rapid identification of circuit types.
- I. Wiring within sub panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.

3.4 DEVICES

- A. Relays and other devices shall be mounted in auxiliary panels and shall be securely fastened to avoid false indications and failures due to shock or vibration.
- B. Wiring within panels shall be arranged and routed to allow accessibility to equipment for adjustment and maintenance.
- C. All devices and appliances shall be mounted to or in an approved electrical box.

3.5. CERTIFICATE OF COMPLIANCE

A Certificate of Compliance shall be completed and submitted to the Architect, in accordance with NFPA 72, most current edition, as required by the State Of Louisiana Fire Marshall.

3.6. FIELD QUALITY CONTROL

- A. Testing, general
 - 1. All Alarm Initiating Devices shall be observed and logged for correct zone and sensitivity. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the initials of the installing technician and date.
 - 2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
 - 3. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector shall be corrected.
 - 4. Test reports shall be delivered to the acceptance inspector as completed.
 - 5. All test equipment, the installing contractor shall make instruments, tools and labor required to conduct the system tests available. The following equipment shall be a minimum for conducting the tests:
 - a) Ladders and scaffolds as required to access all installed equipment.
 - b) Multi-meter for reading voltage, current and resistance.
 - c) Two way radios, and flashlights.
 - d) A manufacturer recommended device for measuring airflow through air duct smoke detector sampling assemblies.
 - e) Decibel meter.
 - f) In addition to the testing specified shall be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.

3.7 ACCEPTANCE TESTING

- A. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation shall be submitted by the Contractor to the Architect and shall be in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
- B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.
- D. The acceptance inspector shall use the system record drawings in combination with the documents specified in this specification during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
 - 1. System wiring shall be tested to demonstrate correct system response and

- correct subsequent system operation in the event of:
- a) Open, shorted and grounded signal line circuits.
 - b) Open, shorted and grounded notification circuits.
 - c) Primary power or battery disconnected.
2. System notification appliances shall be demonstrated as follows:
 - a) All alarm notification appliances actuate as programmed
 - b) Audibility and visibility at required levels.
 3. System indications shall be demonstrated as follows:
 - a) Correct message display for each alarm input at the control display.
 - b) Correct annunciator light for each alarm input at each annunciator and graphic display as shown on the drawings.
 - c) Correct history logging for all system activity.
 4. System off-site reporting functions shall be demonstrated as follows:
 - a) Correct point transmitted for each alarm input
 - b) Trouble signals received for disconnect
 5. Secondary power capabilities shall be demonstrated as follows:
 - a) System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
 - b) System primary power shall be restored for forty-eight hours and system-charging current shall be normal trickle charge for a fully charged battery bank.
 - c) System battery voltages and charging currents shall be checked at the fire alarm control panel

3.8 DOCUMENTATION

- A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
 1. System record drawings and wiring details including one set of reproducible masters and drawings on a CD ROM in a DXF format suitable for use in a CAD drafting program.
 2. System operation, installation and maintenance manuals.
 3. System matrix showing interaction of all input signals with output commands.
 4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
 5. System program showing system functions, controls and labeling of equipment and devices.

3.9 SERVICES

- A. The contractor shall warrant the entire system against mechanical and electrical defects for a period described in the contract general conditions.
- B. The fire alarm system subcontractor shall offer, for the owner's consideration at the time of system submittal, a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72. The owner shall have the option of renewing at the price quoted for single or multiple years up to five years.
- C. The contractor performing the contract services shall be qualified and listed to maintain ongoing certification of the completed system to the UL for specific installed system listing.
- D. The installation contractor shall furnish training as follows for a minimum of four employees of the system user:
 1. Training in the receipt, handling and acknowledgment of alarms.

2. Training in the system operation including manual control of output functions from the system control panel.
3. Training in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
4. The total training requirement shall be a minimum of 2 hours, but shall be sufficient to cover all items specified.

END OF SECTION

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes soil treatment for termite control under building slabs and foundations.

1.2 DEFINITIONS

- A. EPA: Environmental Protection Agency.
- B. PCO: Pest control operator.

1.3 SUBMITTALS

- A. Product Data: Treatments and application instructions, including EPA-Registered Label.
- B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.
- C. Warranties: Submit sample copy of warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.
- B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.6 COORDINATION

- A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.7 WARRANTY

- A. Warranty: Furnish written warranty, executed by Applicator and Contractor on Certificate Form issued by the State of Louisiana, certifying that applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Renewable Option: At the end of the guaranty period, offer the Owner a renewable guaranty on a year-to-year basis, at the Owner's option, at an agreed upon annual fee.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: Under regulation of the Louisiana Department of Agriculture and Forestry, the following termiticides are permitted for application by a certified and licensed termiticide applicator:
 - 1. Dragnet EPA # 279-3062.
 - 2. T'N'T Termite and Turf EPA #654-13.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.
- C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

- A. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- B. Storage, mixing, and application of the product shall be in strict accordance with all product labeling and all local, state and federal regulations.

3.4 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.
 - 1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit

penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.

- B. Application Rates: Apply soil treatment solution as follows, unless more stringent requirements are required by termiticide manufacturer.
 - 1. Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following application rates:
 - a. Apply 4 gallons of chemical solution per 10 linear feet to soil in critical areas under slab, including entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.
 - b. Apply 1 gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution per 10 sq. ft. to areas where fill is washed gravel or other coarse absorbent material.
 - c. Apply 4 gallons of chemical solution per 10 linear feet of trench for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6 to 8 inches wide along outside of foundation to a depth of not less than 12 inches. Punch holes to top of footing at not more than 12 inches o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in the trench.
- C. Provide trench and rodding around building perimeter. Make trenches 6-inches wide x 6-inches deep, and rods 12-inches on centers. Apply at rate of 4 gal. per linear foot of trench and per linear foot depth of holes, unless noted otherwise by manufacturer..
- D. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- E. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- F. Post warning signs in areas of application.
- G. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 POST TREATMENT

- A. One year after substantial completion of the project, applicator shall return to the project site to re-treat the project.

END OF SECTION 31 31 16