Project Manual
100% Construction Documents

Okaloosa County
New Tax Collector Office Building
1448 Commerce Drive
Crestview, FL 32539

ITB PW 26-25
PROJECT NO. 24044
FEBRUARY 05, 2025

DAG ARCHITECTS INC
1223 Airport Road, Destin, FL 32541
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DOCUMENT 00 11 16 - INVITATION FOR BIDS

1.1 PROJECT INFORMATION

A. Notice to Bidders: Prequalified bidders may submit bids for project as described in this Document. Submit bids according to the Instructions to Bidders.

1. Regulatory Requirements: Florida Statutes, County's Purchasing Manual and this ITB shall govern submittal, opening, and award of bids

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

G. Project Description:

1) NEW TAX COLLECTOR'S OFFICE BUILDING CONSISTING OF TWO STORY 35,000 SF BUILDING WITH NEW PARKING AND LANDSCAPING THAT INCLUDES TRANSACTION COUNTERS, OFFICES, CONFERENCES, WORKSPACES, AND FUTURE SHELL SPACE LOCATED IN CRESTVIEW, FLORIDA.

H. Construction Contract: Bids will be received for the following Work:

1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive electronic lump sum bids until the bid time and date via Vendor Registry. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. Bid Date: April 2, 2025.
2. Bid Time: 3:00 p.m. local time.

B. Bids will be thereafter open and read out loud.

1.3 BID SECURITY

A. A Bid must be accompanied by Bid Security made payable to OWNER in an amount of 5% of BIDDER's maximum Bid price and in the form of a cashier's check or a Bid Bond on the form attached issued by a surety meeting the requirements of Article 11 of the AIA A201-2017 General Conditions.

B. A copy of the Bid Security shall be uploaded with their bid. The original Bid Security shall be delivered to the Issuing Office (c/o DeRita Mason, Okaloosa County Purchasing Department, 5479A Old Bethel Road, Crestview, FL 32536) within five business days from the days from the date set forth to receive bids. Failure to deliver the Bid Security within the five-business day window may cause the Bid to be declared non-responsive.

C. The Bid Security of the apparent Successful BIDDER will be retained until OWNER awards the contract to such BIDDER, and such BIDDER has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid Security will be released. If the Successful BIDDER fails to execute and deliver the Contract Documents and furnish the required contract security within 10 days after the Notice of Award, OWNER may consider BIDDER to be in default, annul the Notice of Award and the Bid Security of that BIDDER will be forfeited.

D. The Bid Security of other BIDDERs whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of ten (10) days after the effective date of the Agreement or sixty-one (61) days after the bid opening whereupon Bid Security furnished by such BIDDERS will be released.

E. Bid Security of other BIDDERs that OWNER believes do not have a reasonable chance of receiving the award will be released within ten days after the Bid opening.

1.4 PREBID MEETING

A. Prebid Meeting: See Document 00 25 13 "Prebid Meetings."

1.5 DOCUMENTS

A. Procurement and Contracting Documents: Can be found on vendor registry for registered vendors.

1.6 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time. Work is subject to liquidated damages.

B. Applicable liquidated damages are the amounts established in the following schedule:

Original Contract Amount Daily Charge Per Calendar Day

$299,999 and under..... $904
$300,000 but less than $2,000,000..... $1,685
$2,000,000 but less than $5,000,000..... $2,667
$5,000,000 but less than $10,000,000..... $3,813
$10,000,000 but less than $20,000,000..... $5,021
$20,000,000 but less than $40,000,000..... $7,442
$40,000,000 and over……$10,224 plus 0.00005 of any amount over $40 million (Round to the nearest whole dollar)

1.7 BIDDER'S QUALIFICATIONS

A. Bidders must be prequalified by Owner.

B. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

END OF SECTION 00 11 16

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DOCUMENT 00 21 13 - INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements by reference.

1. A copy of AIA Document A701, "Instructions to Bidders," is bound in this Project Manual.

END OF DOCUMENT 00 21 13

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AIA® Document A701® – 2018

Instructions to Bidders

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

Okaloosa County Tax Collector Office (Architect's Project 24044)
1448 Commerce Drive Crestview, FL 32539
New office consisting of two story 35,000 SF building

THE OWNER:
(Name, legal status, address, and other information)

Okaloosa County
Board of County Commissioners
1250 N. Eglin Pkwy
Shalimar, FL 32579

THE ARCHITECT:
(Name, legal status, address, and other information)

DAG Architects, Inc.
1223 Airport Rd. #104
Destin FL, 32541

TABLE OF ARTICLES

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

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

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 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.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 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.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

via Vendor Registry **https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=21d474a1-e536-4f4d-9f2c-77c3b1e3c683**

(Paragraph deleted)

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 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 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's and Owner's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect and Owner approve a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders via Vendor Registry known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than seven days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 The Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. The Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

4.2.1.1 A Bid must be accompanied by Bid Security made payable to OWNER in an amount of 5% of BIDDER's maximum Bid price and in the form of a cashier's check or a Bid Bond on the form attached issued by a surety meeting the requirements of Article 11 of the AIA A201-2017 General Conditions and as modified by Supplementary Conditions.

4.2.1.2 A copy of the Bid Security shall be uploaded with their bid. The original Bid Security shall be delivered to the Issuing Office (c/o DeRita Mason, Okaloosa County Purchasing Department, 5479A Old Bethel Road, Crestview, FL 32536) within five business days from the days from the date set forth to receive bids. Failure to deliver the Bid Security within the five-business day window may cause the Bid to be declared non-responsive.

4.2.1.3 The Bid Security of the apparent Successful BIDDER will be retained until OWNER awards the contract to such BIDDER, and such BIDDER has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid Security will be released. If the Successful BIDDER fails to execute and deliver the Contract Documents and furnish the required contract security within 10 days after the Notice of Award, OWNER may consider BIDDER to be in default, annul the Notice of Award and the Bid Security of that BIDDER will be forfeited.

4.2.1.4 The Bid Security of other BIDDERs may be retained by OWNER until the earlier of ten (10) days after the effective date of the Agreement or **sixty-one (61) days** after the bid opening whereupon Bid Security furnished by such BIDDERS will be released.

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning sixty-one (61) days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Interested respondents desiring consideration shall submit their response online at Vendor Registry through the link provided below:

https://vrapp.vendorregistry.com/Bids/View/BidsList?BuyerId=21d474a1-e536-4f4d-9f2c-77c3b1e3c683

§ 4.3.2 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

(Paragraph deleted)

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

If a Check is provided, the owner will return to the Bidder upon withdrawal. If Bond is provided, it is up to the Bidder to cancel or allow the Bond to expire.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Reserved

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required recorded bonds to the Owner not later than ten (10) days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

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

.5 Drawings

Number	Title	Date
Per Index of Drawings On Sheet G-002		

.6 Specifications

Section	Title	Date	Pages
Per Table of Contents of the Project Manual			

.7 Addenda:

Number	Date	Pages
Per Bid Forms		

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

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

[ ] The Sustainability Plan:

Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

DOCUMENT 00 22 13 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1.1 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1. AIA Document A701, "Instructions to Bidders”. A copy of which is bound in this Project Manual.
2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

A. The following supplements modify AIA Document A701, "Instructions to Bidders." Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, unaltered portions of the Instructions to Bidders shall remain in effect.

1.3 ARTICLE 2 - BIDDER'S REPRESENTATIONS

A. Add Section 2.1.3.1:

1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

B. Add Section 2.1.5:

1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of the State of Florida and meets qualifications indicated in the Procurement and Contracting Documents.

C. Add Section 2.1.6:

1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.4 ARTICLE 3 - BIDDING DOCUMENTS

A. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:

1. Add Section 3.2.2.1:

a. 3.2.2.1 - Submit Bidder's Requests for Interpretation using form bound in the Project Manual.

B. 3.4 - Addenda:

1. Add Section 3.4.4.1:

a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:

1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.5 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.8:

a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

2. Add Section 4.1.9:

a. 4.1.9 - Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

B. 4.3 - Submission of Bids:

1. Add Section 4.3.1.2:

a. 4.3.1.2 - Include Bidder's Contractor License Number applicable to Project jurisdiction per online directions.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

a. 4.4.2.1 - Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.

D. 4.5 - Break-Out Pricing Bid Supplement:

1. Add Section 4.5:

    a. 4.5 - Provide detailed cost breakdowns no later than two business days following Architect's request.

E. 4.6 - Subcontractors, Suppliers, and Manufacturers List Bid Supplement:

1. Add Section 4.6:

    a. 4.6 - Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products no later than two business days following Architect's request. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Architect.

1.6 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.2 - Rejection of Bids:

1. Add Section 5.2.1:

    a. 5.2.1 - Owner reserves the right to reject a bid based on Owner's and Architect's evaluation of qualification information submitted following opening of bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors.

1.7 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Add Section 6.1.1:

    a. 6.1.1 - Submit Contractor's Qualification Statement no later than two business days following Architect's request.

B. 6.3 - Submittals:

1. Add Section 6.3.1.4:

    a. 6.3.1.4 - Submit information requested in Sections 6.3.1.1, 6.3.1.2, and 6.3.1.3 no later than two business days following Architect's request.

1.8 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

a. 7.1.1.1 - Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

B. 7.2 - Time of Delivery and Form of Bonds:

1. Delete the first sentence of Section 7.2.1 and insert the following:

a. The Bidder shall deliver the required copy of bonds to Owner no later than 10 days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. The Bidder will be required to have original bond recorded after final signature of contract and return to Okaloosa County Purchasing, 5479A Old Bethel Rd., Crestview, FL no later than 10 days after final signature. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

a. 7.2.3 - Bonds shall be executed and be in force on the date of the execution of the Contract.

1.9 ARTICLE 9 - EXECUTION OF THE CONTRACT

A. Add Article 9:

1. 9.1.1 - Subsequent to the Notice of Intent to Award, and within 10 days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner, in such number of counterparts as Owner may require.
2. 9.1.2 - Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed.
3. 9.1.3 - Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement or the date that the Bidder is obligated to deliver the executed Agreement and required bonds to Owner.
4. 9.1.4 - In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

END OF DOCUMENT 00 22 13

DOCUMENT 00 25 13 - PREBID MEETINGS

1.1 PREBID MEETING

A. **Owner** will conduct a Prebid meeting as indicated below:

1. Meeting Date: March 19, 2025
2. Meeting Time: 9:00 a.m., local time.
3. Location: Public Works Department
   Okaloosa County, FL
   1759 S Ferdon Blvd
   Crestview, FL 32536

B. Attendance:

1. Prime Bidders: Attendance at Prebid meeting is mandatory.
2. Subcontractors: Attendance at Prebid meeting is recommended.
3. Notice: Bids will only be accepted from prime bidders represented on Prebid Meeting sign-in sheet.

C. Bidder Questions: Submit questions via Vendor Registry and will to be addressed at Prebid meeting minimum of two business days prior to meeting.

D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

1. Procurement and Contracting Requirements:
   a. Instructions to Bidders.
   b. Bidder Qualifications.
   c. Bonding.
   d. Insurance.
   e. Bid Form and Attachments.
   f. Bid Submittal Requirements.
   g. Bid Submittal Checklist.
   h. Notice of Award.

2. Communication during Bidding Period:

   a. Obtaining documents.
   b. Bidder's Requests for Information.
   c. Bidder's Substitution Request/Prior Approval Request.
   d. Addenda.

3. Contracting Requirements:

   a. Agreement.
   b. The General Conditions.

c. The Supplementary Conditions.
d. Other Owner requirements.

4. Construction Documents:

a. Scopes of Work.
b. Temporary Facilities.
c. Use of Site.
d. Work Restrictions.
e. Alternates, Allowances, and Unit Prices.
f. Substitutions following award.

5. Separate Contracts:

a. Work by Owner.
b. Work of Other Contracts.

6. Schedule:

a. Project Schedule.
b. Contract Time.
c. Liquidated Damages.
d. Other Bidder Questions.

7. Site/facility visit or walkthrough.
8. Post-Meeting Addendum.

E. Minutes: Owner will record and distribute meeting minutes to attendees. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

1. Sign-in Sheet: Minutes will include list of meeting attendees.

END OF DOCUMENT 00 25 13

DOCUMENT 00 31 19 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings that include information on existing conditions including previous construction at Project site are not available.

C. Survey information that includes information on existing conditions, see civil documents.

D. Related Requirements:

1. Document 00 21 13 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
2. Document 00 31 32 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 00 31 19

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SECTION 00 31 32 - GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. A geotechnical investigation reports for Project, prepared by NOVA Engineering and Environmental LLC, is available for viewing as appended to this Document. The following are dates for the attached documents:
   1. July 22, 2024.

END OF SECTION 00 31 32

GEOTECHNICAL ENGINEERING REPORT

Okaloosa County Tax Collector
Crestview, Okaloosa County, Florida

PREPARED FOR:
DAG Architects
1223 Airport Road
Destin, Florida 32541

NOVA Project Number: 10116-2024095

July 22, 2024

NOVA
PROFESSIONAL | PRACTICAL | PROVEN

July 22, 2024

DAG Architects
1223 Airport Road
Destin, Florida 32541

Attention: Mr. Jamey W. Mattern, Jr., AIA, NCARB

Subject: **Geotechnical Engineering Report**
OKALOOSA COUNTY TAX COLLECTOR
Crestview, Okaloosa County, Florida
NOVA Project Number 10116-2024095

Dear Mr. Mattern:

NOVA Engineering and Environmental, LLC (NOVA) has completed the authorized Geotechnical Engineering Report for the proposed development in Crestview, Florida. The work was performed in general accordance with NOVA Proposal Number 10116-2024095, dated March 14, 2024. This report briefly discusses our understanding of the project at the time of the subsurface exploration, describes the geotechnical consulting services provided by NOVA, and presents our findings, conclusions, and recommendations.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,
NOVA Engineering and Environmental LLC

Eric L. H. Sharpe
Staff Engineer

JESSE A JAMES LICENSE No. 90470 STATE OF FLORIDA PROFESSIONAL ENGINEER

Jesse A. James, P.E.
Branch Manager
STATE OF FLORIDA
Professional Engineer No. 90470

This item has been electronically signed and sealed by Jesse A. James, P.E., using a Digital Signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Digitally signed by Jesse James
Date: 2024.07.22 13:51:23-05'00'

Copies Submitted: Addressee (electronic)

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

This section provides information relating to our contract, the purpose of our work, and a summary of our understanding of the project,

1.1 NAME AND LOCATION OF PROJECT

The Subject Property is located along Commerce Drive in Crestview, Okaloosa County, Florida. The location of the site is indicated on the Site Location Map included in Appendix A.

1.2 AUTHORIZATION AND SCOPE OF STUDY

Our work on this project was as described in our Proposal Number 10116-2024095, dated March 14, 2024. The primary objectives of this work were to perform a geotechnical exploration within the areas of the proposed construction and to assess these findings as they relate to geotechnical aspects of the planned site development. The authorized geotechnical engineering services included site reconnaissance, soil test boring and sampling, engineering evaluation of the field and laboratory data, and the preparation of this report. As authorized per the above referenced proposal, this completed geotechnical report includes:

- A description of the site, fieldwork, laboratory testing and general soil conditions encountered, as well as a Boring Location Plan, and individual Test Boring Records.
- Site preparation considerations that include geotechnical discussions regarding site stripping and subgrade preparation and engineered fill/backfill placement.
- Recommendations for controlling groundwater and/or run-off during construction, and the potential need for permanent dewatering systems based on the anticipated post construction groundwater levels.
- Shallow foundation system recommendations for the proposed structure, including an allowable foundation capacity and recommended bearing depth, an ultimate coefficient of friction value, an allowable temporary bearing capacity (wind loads), soil design parameters for vertical/lateral loads, and installation considerations.
- Slab-on-grade construction considerations, including the appropriate modulus of subgrade reaction (k), sub-base requirements, and the potential need for a sub-slab vapor barrier or a capillary layer.
- Flexible (asphalt) pavement design recommendations based on either assumed/provided traffic loadings.
- Suitability of on-site soils for re-use as structural fill and backfill. Additionally, the criteria for suitable fill materials will be provided.
- Recommended quality control measures (i.e., sampling, testing, and inspection requirements) for site grading, foundation, and pavement construction.

The assessment of the presence of wetlands, floodplains, or water classified as state waters was beyond the scope of this exploration. Additionally, the assessment of site environmental conditions, including the detection of pollutants in the soil, rock, or groundwater, at the site was also beyond the scope of this geotechnical exploration and evaluation.

2.0 PROJECT INFORMATION

Our understanding of this project is based on discussions with the Client, review of the provided site plan, a site reconnaissance during boring layout, and our experience with similar projects.

2.1 PROJECT SITE

At the time of our field visit, the areas of interest were vacant parcels observed to be generally flat. The existing stormwater management system for the development consisted of a relatively deep retention basin employing an underdrain system.

2.2 PROPOSED DEVELOPMENT

The proposed project will include constructing a two-story 19,000 ft^2 office structure and an asphalt paved parking lot with approach drives along Commerce Drive. We have assumed that the construction will utilize the existing stormwater management system for the overall development.

Maximium Loads

We anticipate that the structure will be supported on a shallow foundation system. Structural loadings and grading details were not available from the design team at the time of the completion of this report; we have therefore assumed that maximum loadings for the proposed building will not exceed 100 kips per column for isolated interior columns and 4 kips per lineal foot for continuous load bearing walls.

Site Grading

We assume that finish site grades will not change greater than +/- 2 feet from existing grades within the proposed structure footprint and pavement areas.

3.0 SUBSURFACE EXPLORATION

3.1 AREA GEOLOGY

The site is located in the Okaloosa County, Florida area and according to the United States Geological Survey (USGS), is situated within the greater Gulf Coastal Plain region. The site is generally covered with Alluvium sediments of the Pleistocene/Holocene periods underlain by the Citronelle formation of the Pliocene/Pleistocene periods. The alluvial sediments typically consist of siliciclastics that are fine to coarse quartz sand containing clay lenses and gravel in places. Sands consists primarily of very fine to very coarse poorly sorted quartz grains; gravel is composed of quartz, quartzite, and chert pebbles. In areas of the Valley and Ridge province gravels are generally composed of angular to sub-rounded chert, quartz, and quartzite pebbles. Coastal deposits in the Okaloosa County area include fine to medium quartz sand with shell fragments and accessory heavy minerals along Gulf beaches and fine to medium quartz sand, silt, clay, peat, mud and ooze in the Mississippi Sound, Little Lagoon, bays, lakes, streams, and estuaries. The Citronelle formation consists primarily of varicolored/mottled lenticular beds of poorly sorted sand, clayey sand, clay, and clayey gravel. Limonite pebbles and lenses of limonite cemented sand occur locally in weathered Miocene exposures.

Surficial soils in the region are primarily siliciclastic sediments deposited in response to the renewed uplift and erosion in the Appalachian highlands to the north and sea-level fluctuations. The extent and type of deposit is influenced by numerous factors, including mineral composition of the parent rock and meteorological events.

3.2 FIELD EXPLORATION

Our field exploration was conducted in June 2024, and included performing:

- Seven 30-foot deep SPT borings within the proposed structure footprint.
- Four 5-foot deep auger borings within the proposed pavement areas.
- Two 15-foot deep auger borings within the existing SMS basin.

The boring locations were established in the field by NOVA personnel using a handheld GPS device and estimating distances and angles from site landmarks. Prior to initiating field testing, underground utilities were marked by Sunshine 811. Any required underground utility related adjustments of the test locations were then made at the time of the field exploration. The approximate test locations are shown in Appendix B. If increased accuracy is desired by the Client, the boring locations and elevations may be surveyed.

The Test Boring Records in Appendix B shows the field-measured Standard Penetration Test (SPT) resistances, or "N-values", for the structure borings and presents the soil conditions encountered in all of the borings. These records represent our interpretation of the subsurface conditions based on the field exploration data, visual examination of the split-barrel samples, laboratory test data, and generally accepted geotechnical engineering practices. The stratification lines and depth designations represent approximate boundaries between various subsurface strata. Actual transitions between materials may be gradual.

The groundwater levels reported on the Test Boring Records represent measurements made at the completion of each test boring, following a suitable stabilization period. The test borings were subsequently backfilled with soil cuttings from the drilling process for safety concerns.

SPT Borings

The test borings were performed using the guidelines of ASTM Designation D-1586, "Penetration Test and Split-Barrel Sampling of Soils". A mud rotary drilling process was used to advance the boring once groundwater was encountered. At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing.

Hand Auger Borings

The auger borings were performed using the guidelines of ASTM Designation D-1452, "Soil Exploration and Sampling by Auger Borings". A manually advanced 3¼-inch diameter orchard-type auger was utilized with disturbed samples acquired continuously for the full depth of the boring. Representative portions of the soil samples, obtained from the sampler, were placed in sealed containers and transported to our laboratory for further evaluation and laboratory testing.

3.3 LABORATORY TESTING

Following completion of the field work, soil and rock samples obtained in the field were returned to our facility for classification and laboratory testing assignment.

These tests included the following:

- Manual/Visual Soil Classification
- Moisture Content
- Fines Content (minus the #200 sieve)
- Falling Head Laboratory Permeability Test

The purpose of the testing program was to classify the subsurface materials relative to the Unified Soil Classification System (USCS) and to determine their physical characteristics including strength, and compressibility. Detailed descriptions of the tests conducted are presented in Appendix C. The soil samples will be discarded 30 days following the submittal of this report, unless you request otherwise.

3.4 SUBSURFACE CONDITIONS

The following paragraphs provide generalized descriptions of the subsurface profile and soil conditions encountered in the borings conducted during this exploration.

Native Soils

Beneath up to 3 inches of topsoil, the test borings generally encountered loose to medium dense fine-grained silty sands (USCS classification of SM) to depths varying between about 2 feet to 8 feet below existing grade (BEG) underlain by loose to medium dense fine-grained clayey sands (SC) to roughly 23 feet to 26 feet BEG, in turn underlain by loose to medium dense fine-grained slightly silty to poorly-graded sands (SP-SM, SP) to the maximum depth explored of approximately 30 feet BEG.

Groundwater Conditions

Groundwater in the Gulf Coastal Plain typically occurs as an unconfined aquifer condition. Recharge is provided by the infiltration of rainfall and surface water through the soil overburden. More permeable zones in the soil matrix can affect groundwater conditions. The groundwater table is expected to be a subdued replica of the original surface topography. Based on a review of topographic maps and our visual site observations, we anticipate the groundwater flow at the site to be towards the south.

Groundwater levels vary with changes in season and rainfall, construction activity, surface water runoff and other site-specific factors. Groundwater levels in the Okaloosa County area are typically lowest in the late fall to winter and highest in the early spring to mid-summer with annual groundwater fluctuations by seasonal rainfall; consequently, the water table may vary at times.

A stabilized groundwater table was not encountered in the borings within the maximum depth explored of about 30 feet BEG at the time of our field exploration, which occurred during a period of relatively normal seasonal rainfall and within a pattern of frequent (daily) rain events. Based on comparisons of current annual monthly rainfall data to historical rainfall data extending back 50+ years in time, we estimate that the normal permanent seasonal high groundwater (SHGW) table for this site will remain at a depth greater than 30 feet BEG, during the wet season.

4.0 GEOTECHNICAL ASSESSMENT

The following assessment is based on our understanding of the proposed construction, our site observations, our evaluation and interpretation of the field data obtained during this exploration, our experience with similar subsurface conditions, and generally accepted geotechnical engineering principles and practices.

Based on the boring results, following site stripping of trees, surficial vegetation and topsoil as well as any other deleterious materials found to be present, the proposed construction appears to be feasible employing conventional site preparation practices as recommended in the *Site Preparation* section of this report.

A stabilized groundwater table was not encountered within the maximum depth explored of about 30 feet BEG and is therefore not expected to adversely impact the development of this property.

After the recommended site/subgrade preparation and fill placement has been completed, we recommend that the proposed structure be supported on a conventional shallow foundation system bearing upon compacted structural fill. Foundations may be designed employing a maximum allowable soil bearing pressure of 2,000 pounds per square foot (psf).

Based on the results of SMS test borings, the subsurface conditions encountered beneath the proposed SMS basin appear to be unsuitable for employing a stormwater management system consisting of a conventional shallow dry retention pond due to the very low permeability soil strata encountered throughout the 15-foot-deep SMS test borings. We recommend employing an alternative method of stormwater treatment and disposal for this site.

We note that subsurface conditions in unexplored locations can and will vary from those encountered at the boring locations considered and discussed herein. If such variations are noted during construction, or if project development plans are changed, we request the opportunity to review the changes and amend our recommendations, if necessary.

The following sections present our recommendations for site preparation and grading, and for the design of the planned shallow foundation system, flexible pavement sections, and the SMS.

5.0 RECOMMENDATIONS

5.1 SITE PREPARATION

We anticipate that finished site grades will require less than 2 feet of fill, and no cut, relative to existing grades within the proposed structure footprint and pavement areas.

Prior to proceeding with construction, all topsoil and vegetation, trees and associated root systems, and any other deleterious non-soil materials found to be present should be stripped from the proposed construction areas. Clean topsoil may be stockpiled and subsequently re-used in landscaped areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations. Any existing utility locations should be reviewed to assess their impact on the proposed construction and relocated/grouted in-place as appropriate.

After clearing and stripping, areas that are at grade or which will receive fill should be carefully evaluated by a NOVA geotechnical engineer. This evaluation should initially include observation of the materials exposed below the stripped subgrade, The exposed materials should be proofrolled with multiple passes of a 20 to 30 ton loaded truck, or other vehicle of similar size and weight under the observation of the geotechnical engineer. The purpose of the proofrolling is to locate soft, weak, or excessively wet fill or residual soils present at the time of construction. Unstable materials observed during the evaluation and proofrolling operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying.

The soils exposed at the stripped grade elevation should then be compacted to a minimum soil density of at least 98 percent of the maximum dry density as determined by the Modified Proctor test method (ASTM D-1557).

NOVA should observe the compaction of the subgrade to locate soft, weak, or excessively wet fill or existing soils present at the time of construction. Any unstable materials observed during the evaluation and compaction operations should be undercut and replaced with structural fill or stabilized in-place by scarifying and re-densifying. Actual remedial recommendations can best be determined by the geotechnical engineer in the field at the time of construction.

5.2 EXCAVATION

Excavations greater than five feet deep (such as for deeper foundations and underground utilities) should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29CFR Part 1926), excavation safety standards. We note that the Contractor is solely responsible for site safety. This information is

provided only as a service and under no circumstances should NOVA be assumed to be responsible for construction site safety. Each excavation should be observed and classified by an OSHA-competent person. All excavations below the groundwater level are classified as OSHA Class C soils for excavation purposes. After stripping and trench excavation, a NOVA geotechnical engineer should carefully evaluate the exposed soils. We recommend undercutting the proposed pipe trench areas approximately ½ foot below the proposed pipe bearing elevations and installing structural backfill for use as pipe bedding materials. Sewer pipe installation should be constructed in general compliance with ASTM D 2321, standard practice for underground installation of pipe for sewers and other gravity flow applications.

Groundwater Control

A stabilized groundwater table was not encountered within the maximum depth explored of about 30 feet BEG at the time of our field exploration, which occurred during a period of relatively normal seasonal rainfall and within a pattern of frequent (daily) rain events. Apparent groundwater is therefore not expected to adversely impact the planned development of this property. However, shallow perched/laterally flowing groundwater conditions should be anticipated as being present for this project, particularly if the proposed construction areas of the overall site are not properly graded during construction to prevent the accumulation of stormwater runoff during and shortly following significant rain events from perching on the underlying low-permeability silty and clayey sand soils.

Maintaining proper grades (i.e., positive drainage paths) during the construction phase of this project will be critical to avoid the development of "bird baths" in proposed construction areas, which would degrade the underlying silty and clayey sand soils and require undercutting to more firm underlying soils.

Should perched water conditions be encountered during the earthwork phase of this development, most likely localized dewatering efforts (e.g., construction ditches, temporary sumps, etc.) will suffice to allow for earthwork operations to be performed in the dry.

5.3 FILL PLACEMENT

Fill Suitability

Fill materials should be relatively clean sands with less than 12 percent fines (material passing the No. 200 sieve, USCS classifications of SP and SP-SM), and free of non-soil materials and rock fragments larger than 3 inches in diameter.

Soils with fines contents between 13 and 25 percent may also be used as fill soils for this project, but we note that strict moisture control would be required at the time of placement for these moisture-sensitive soils.

Based on visual examination and limited laboratory soil testing results, the existing surficial soils encountered during this exploration typically consisted of fine-grained silty sands (SM). This relatively sandy soil type is considered suitable for use as structural fill in the construction areas but we note that strict moisture control would be required at the time of placement for these moisture-sensitive soils.

Fill material should be free of rubble, clay, rock, roots and organics, and should be installed within +/-2% of its optimum moisture content at the time of placement. Any off-site materials used as fill should be approved by NOVA prior to acquisition. Organic and/or debris-laden material is not suitable for re-use as structural fill. Topsoil, mulch, and similar organic materials can be wasted in architectural areas. Debris-laden materials should be excavated, transported, and disposed of off-site in accordance with appropriate solid waste rules and regulations.

Soil Compaction

Fill should be placed in thin, horizontal loose lifts (maximum 12-inch) and compacted to a minimum soil density of at least 98 percent of the Modified Proctor maximum dry density (ASTM D-1557). The upper 12 inches of soil beneath the bottoms of all foundation footings and beneath pavements (i.e., the Stabilized Subgrade Course) should also be compacted to at least 98 percent. In confined areas, such as utility trenches or behind retaining walls, portable compaction equipment and thinner fill lifts (3 to 4 inches) may be necessary.

Fill materials used in structure areas should have a target maximum dry density of at least 95 pounds per cubic foot (pcf). If lighter weight fill materials are used, the NOVA geotechnical engineer should be consulted to assess the impact on design recommendations.

Soil moisture content should be maintained within 2 percent of the optimum moisture content. We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. Moisture control may be difficult during rainy weather.

Filling operations should be observed by a NOVA soils technician, who can confirm suitability of material used and uniformity and appropriateness of compaction efforts. The technician can also document compliance with the specifications by performing field density tests using thin-walled tube, nuclear, or sand cone testing methods (ASTM D-2937, D-6938, or D-1556, respectively).

One compaction test per 2,500 square feet of building footprint and every 5,000 square feet of pavement area should be performed at the stripped grade elevation and in each lift of fill, with test locations well distributed throughout the fill mass. One test in each column footing and along every 50 lineal feet of continuous wall footing should also be specified. When filling in small areas, at least one test per day per area should be performed.

5.4 FOUNDATIONS

Foundation support for the proposed structure is anticipated to be accomplished via a conventional shallow foundation system. We have assumed that maximum loadings for the hotel structure will not exceed 100 kips per column for isolated interior columns and 4 kips per lineal foot for continuous load bearing walls.

Shallow Foundation System

Design: After the recommended site and subgrade preparation and fill placement has been completed, it is our opinion that a conventional shallow foundation system consisting of isolated spread footings and/or turn-down slab-on-grade construction can be used to support the proposed structure.

Foundations bearing on densified existing soils and/or compacted structural fill, as recommended in this report, may be designed employing a maximum allowable soil bearing pressure of **2,000 pounds per square foot (psf)**.

We recommend a value of 0.35 can be employed as the coefficient of friction (sliding resistance) between foundations and the underlying residual or fill soils. Footings should be a minimum of 18 inches in width for ease of construction and to reduce the possibility of localized shear failures. Isolated exterior and interior footing bottoms should be established at least 18 inches below finished surrounding exterior grades. When utilizing a post-tensioned monolithic slab-on-grade design, exterior and interior footing bottoms should be established a minimum of 12 inches below adjacent finished grades.

Settlement: Settlements for a spread foundation bearing on structural fill were assessed using SPT values to estimate elastic modulus, based on published correlations and previous NOVA experience. We note that the settlements presented are based on the SPT boring results. Conditions may be better or worse in other areas; however, we believe the estimated settlements are reasonably conservative.

Based on the provided structural loadings, the soil bearing capacity provided above, the presumed foundation elevations as discussed above, we expect residual primary total settlement beneath individual foundations to be on the order of 1 inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate residual differential settlement between adjacent foundations will be less than ½ inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

Foundation support conditions are highly erratic and may vary dramatically in short horizontal distances. It is anticipated that the geotechnical engineer may recommend a different bearing capacity upon examination of the actual foundation subgrade at numerous locations.

To reduce the differential settlement if lower consistency materials are encountered, a lower bearing capacity should be used. We anticipate that timely communication between the geotechnical engineer and the structural engineer, as well as other design and construction team members, will be required.

Construction: Foundation excavations should be evaluated by the NOVA geotechnical engineer prior to reinforcing steel placement to observe foundation subgrade preparation and confirm bearing pressure capacity. Foundation excavations should be level and free of debris, ponded water, mud, and loose, frozen, or water-softened soils. Concrete should be placed as soon as is practical after the foundation is excavated and the subgrade evaluated. Foundation concrete should not be placed on frozen or saturated soil.

If a foundation excavation remains open overnight, or if rain or snow is imminent, a 3 to 4-inch thick "mud mat" of lean concrete should be placed in the bottom of the excavation to protect the bearing soils until reinforcing steel and concrete can be placed.

Slab-On-Grade

The conditions exposed at subgrade levels will vary across the site and may include structural fill. The slab-on-grade may be adequately supported on these subgrade conditions subject to the recommendations in this report. The slab-on-grade should be jointed around columns and along walls to reduce cracking due to differential movement. An underdrain system is not necessary beneath the slab, provided that the slab is established at least 2 feet above the SHGW level.

Once grading is completed, the subgrade is usually exposed to adverse construction activities and weather conditions during the period of sub-slab utility installation. The subgrade should be well-drained to prevent the accumulation of water. If the exposed subgrade becomes saturated or frozen, the geotechnical engineer should be consulted.

After utilities have been installed and backfilled, a final subgrade evaluation should be performed by the geotechnical engineer immediately prior to the slab-on-grade placement. If practical, proofrolling may be used to redensify the surface and to detect any soil that has become excessively wet or otherwise loosened.

Subgrade Modulus

A coefficient of subgrade reaction (***k***) of 125 pci (psi per inch) may be used for conventional slab design where slabs bear upon subgrades prepared in accordance with previous recommendations. Please note that this magnitude of ***k*** is intended to reflect the elastic response of soil beneath a typical floor slab under light loads with a small load contact area often measured in square inches, such as loads from forklifts, automobile/truck traffic or lightly loaded storage racks. The recommended coefficient of subgrade reaction (***k***) of 125 pci is not applicable for heavy slab loads caused by bulk storage or tall storage racks, or for mat foundation design.

Several design methods are applicable for conventional slab design. We have assumed that the slab designer will utilize the methods discussed in the American Concrete Institute (ACI) Committee 360 report, *"Guide to Design of Slabs-on-Ground, (ACI 360R-10)*.

5.5 PAVEMENT CROSS SECTION DESIGN

We understand that a flexible (asphalt) pavement section is desired for the proposed entrance drives and parking areas planned as part of this development.

Recommended heavy duty and light duty pavement sections have been developed for this project based on our understanding of the existing subsurface conditions, review of applicable FDOT specifications, and the assumed loading conditions of 200,000 Equivalent Single-Axle Loads (ESALS) for heavy duty pavement areas and 25,000 Equivalent Single-Axle Loads (ESALS) for standard (light) duty pavement areas, with a 20-year design life. The terminal serviceability index and reliability for these pavement sections were assumed to be 2.0 and 85%, respectively. Traffic exceeding the stated criteria could require heavier pavement sections. Please note that the recommended pavement sections are based on assumed post-construction traffic loadings. If the pavement is to be constructed and utilized by construction traffic, the above pavement sections will likely prove insufficient for heavy truck traffic, such as concrete trucks or tractor-trailers used for construction delivery. Unexpected distress, reduced pavement life and /or pre-mature failure of the pavement section could result if subjected to heavy construction traffic and the owner should be made aware of this risk. If the assumed traffic loading stated herein is not correct, NOVA should review actual pavement loading conditions to determine if revisions to these recommendations are warranted.

Based on the results of our test borings, the subsurface conditions encountered appear to be adaptable for providing adequate subgrade support of a flexible pavement sections in the table below.

Standard Duty Pavement Section	
Surface Course (FDOT 9.5mm or 12.5mm SuperPave	2 inches
Graded Aggregate Base Course (from an FDOT approved source, min. LBR of 100)	6 inches
Stabilized Subgrade (minimum LBR of 40)	12 inches
Heavy Duty Pavement Section	
Surface Course (FDOT 9.5 mm SuperPave)	1½ inches
Structural Course (FDOT 19 mm SuperPave)	2 inches
Graded Aggregate Base Course (from an FDOT approved source, min. LBR of 100)	8 inches
Stabilized Subgrade (minimum LBR of 40)	12 inches

We recommend specifying a minimum compaction requirement of at least 98 percent of the maximum dry density for the stabilized subgrade and base courses as determined by the Modified Proctor compaction test (ASTM D-1557, Method D). The stabilized subgrade and base materials selected should conform to applicable sections of the State of Florida Department of Transportation Standard Specifications for Road and Bridge Construction (Current Edition). All asphalt material and paving operations should meet applicable specifications of the Florida Department of Transportation. A NOVA technician should observe placement and perform density testing of the base course material and asphalt.

5.6 STORMWATER MANAGEMENT SYSTEM

We understand that the project is desired to employ a shallow dry retention basin to treat and dispose of stormwater runoff associated with the planned property improvements. Based on the results of our field exploration, the subsurface conditions encountered beneath the SMS footprint appear to be unsuitable for the treatment and disposal of stormwater runoff via the desired SMS due to the presence of very low-permeability soils to the maximum depth explored of about 15 feet BEG.

We recommend that an alternate means of stormwater treatment and disposal (e.g., installing underdrain systems or designing for a wet-dry hybrid concept) be employed.

The criteria for a "hybrid" wet detention pond would be no different than a standard wet detention pond (reference Section 8 of the ERP Applicant's Handbook, Volume II), with the only major difference being that a vegetated littoral zone would not be sustainable (littoral plantings would not survive the drops in the water table that would be realized over the course of a year). The designer would therefore need to provide 50% additional permanent pool volume (PPV) and would not want to have side slopes steeper than what can be stabilized with sod or seed instead of the more typical transition in a wet pond from flatter side slopes above the PPV for the littoral shelf.

The actual exfiltration rate from the SMS basin may be influenced by basin geometry, natural soil variability, in-situ depositional characteristics and soil density, retention volume, and groundwater mounding effects. Appropriate factors of safety should be incorporated into the design process.

6.0 LIMITATIONS

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at significantly later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study and our experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for NOVA to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between test locations will differ from those encountered at specific test locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

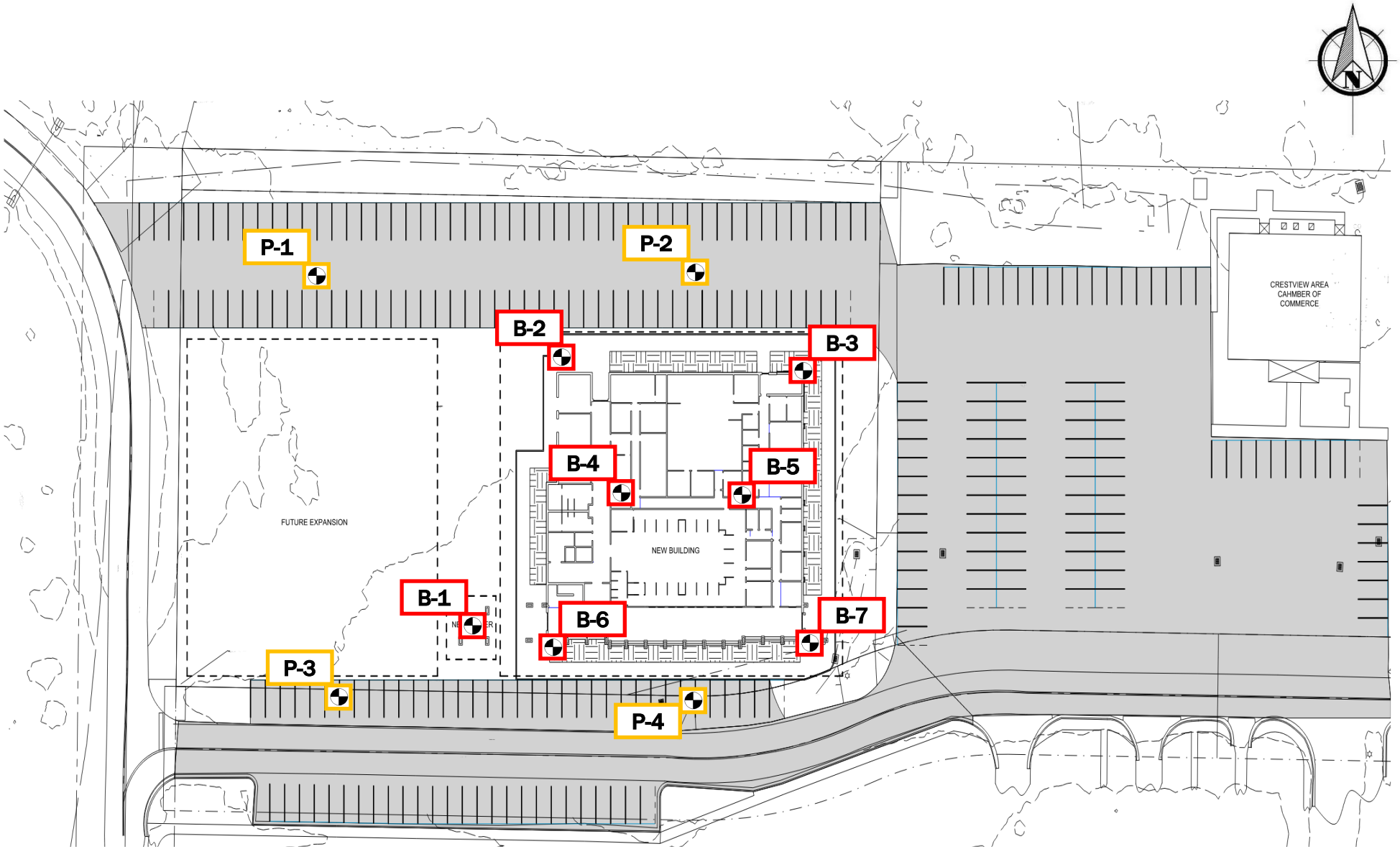
This report is intended for the sole use of **DAG Architects** for the above noted project. The scope of work performed during this study may not satisfy other user's requirements. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. NOVA is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

Our professional services have been performed, our findings obtained, our conclusions derived and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices in the State of Florida. This warranty is in lieu of all other statements or warranties, either expressed or implied.

APPENDIX A
Figures and Maps

Scale: Not To Scale **Date Drawn:** June 17, 2024 **Drawn By:** E. Sharpe **Checked By:** W. Lawrence	NOVA 5001 Commerce Park Circle Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**PROJECT LOCATION MAP** Okaloosa County Tax Collector Crestview, Okaloosa County, Florida *NOVA Project Number 10116-2024095*

APPENDIX B
Subsurface Data



LEGEND

B-x = 30-ft. Structural SPT Boring

P-x = 5-ft. Pavement Auger Boring

Scale: Not To Scale **Date Drawn:** July 10, 2024 **Drawn By:** E. Sharpe **Checked By:** W. Lawrence	NOVA 5001 Commerce Park Circle Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**BORING LOCATION PLAN PAGE 1 of 2** **Okaloosa County Tax Collector** Crestview, Okaloosa County, Florida *NOVA Project Number 10116-2024095*

LEGEND

R-x = 15-ft. SMS Auger Boring

Scale: Not To Scale	NOVA	**BORING LOCATION PLAN PAGE 2 of 2**
Date Drawn: July 10, 2024	5001 Commerce Park Circle Pensacola, Florida 32505 850.607.7782 ♦ 850.249.6683	**Okaloosa County Tax Collector**
Drawn By: E. Sharpe		Crestview, Okaloosa County, Florida
Checked By: W. Lawrence		*NOVA Project Number 10116-2024095*

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
% REC	Percent Core Recovery from Rock Core Drilling
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Medium Stiff – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

NOVA

TEST BORING RECORD B-1

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 14, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Description	N-Value
0		
	TOPSOIL (Approx. 3 inches)	22
	Brown medium dense to very loose fine-grained silty SAND (SM)	3
5	Orange very loose to medium dense fine-grained clayey SAND (SC)	3
		4
		5
10		
		6
15		
		7
20		
		17
25		
	Light orange loose fine-grained SAND (SP)	9
30	Boring Terminated at 30 ft.	
35		

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

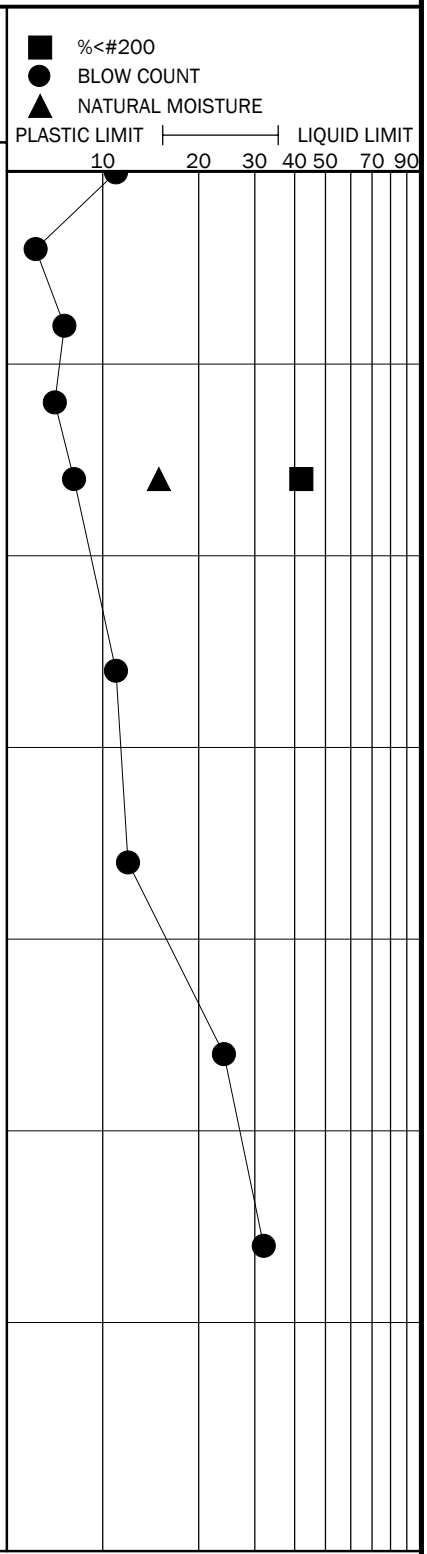
This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-2

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 13, 2024
DEPTH TO - WATER> INITIAL: GNE AFTER 24 HOURS: CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				11
		Gray medium dense fine-grained slightly silty SAND (SP-SM)				3
		Orange very loose to medium dense fine-grained clayey SAND (SC)				6
5						5
						7
10						11
15						12
20						24
25						32
		Light orange dense fine-grained SAND (SP)				
30		Boring Terminated at 30 ft.				
35						



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-3

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 13, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Description	N-Value
0	TOPSOIL (Approx. 3 inches)	
	Orange medium dense to loose fine-grained silty SAND (SM)	12
		5
5	Orange very loose to dense fine-grained clayey SAND (SC)	3
		4
		5
10		
		11
15		
		20
20		
		50
25	Orange hard low-plasticity CLAY with iron rock (CL)	
		64
30	Boring Terminated at 30 ft.	
35		

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-4

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 13, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Description	N-Value
0		
	TOPSOIL (Approx. 3 inches)	14
	Orange medium dense fine-grained silty SAND (SM)	3
	Orange very loose to loose fine-grained clayey SAND (SC)	6
5		7
		5
10		7
15		8
20		9
	Light orange loose fine-grained SAND (SP)	9
25		
30	Boring Terminated at 30 ft.	
35		

Elevation (ft-MSL) | Graphic | Groundwater | Sample Type

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

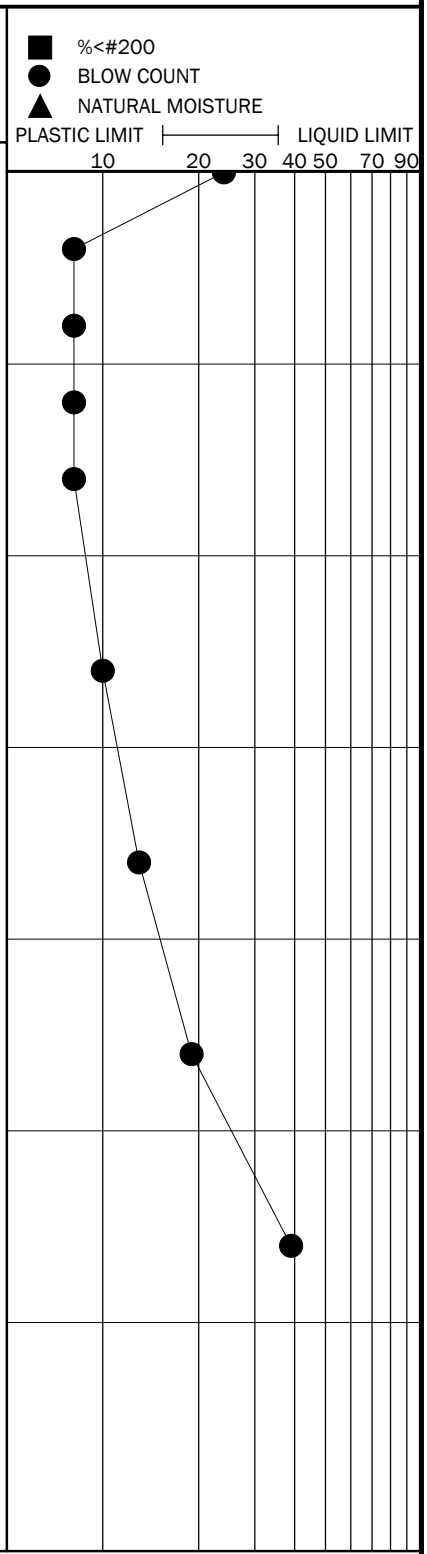
This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-5

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 12, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Description	N-Value
0		
	TOPSOIL (Approx. 3 inches)	
	Brown/orange medium dense to loose fine-grained silty SAND (SM)	24
		7
5	Orange loose to medium dense fine-grained clayey SAND (SC)	7
		7
		7
10		
		10
15		
		13
20		
		19
25		
	Light orange/off-white dense fine-grained SAND (SP)	39
30		
	Boring Terminated at 30 ft.	
35		



This information pertains only to this boring and should not be interpreted as being indicative of the site.

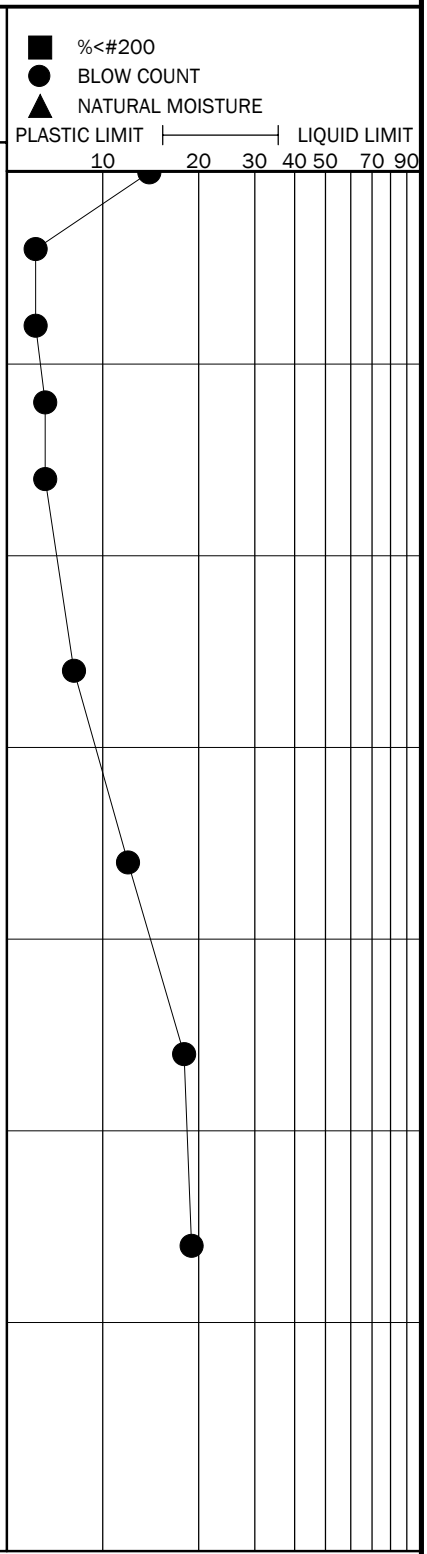
NOVA

TEST BORING RECORD B-6

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 14, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Description	N-Value
0		
	TOPSOIL (Approx. 3 inches)	14
	Brown medium dense to very loose fine-grained silty SAND (SM)	3
		3
5	Orange very loose to medium dense fine-grained clayey SAND (SC)	4
		4
10		
		7
15		
		12
20		
		18
25	Light orange medium dense fine-grained SAND (SP)	
		19
30	Boring Terminated at 30 ft.	
35		

Graphic | Groundwater | Sample Type



This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD B-7

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: STD, Inc. | LOGGED BY: E. Sharpe
DRILLING METHOD: SPT Boring | DATE: June 14, 2024
DEPTH TO - WATER> INITIAL: GNE AFTER 24 HOURS: CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				
		Brown medium dense fine-grained silty SAND (SM)				20
		Orange loose to medium dense fine-grained clayey SAND (SC)				6
5						6
						6
						6
10						
						9
15						
						16
20						
						17
25						
		Light orange medium dense fine-grained SAND (SP)				21
30		Boring Terminated at 30 ft.				
35						

%<#200
BLOW COUNT
NATURAL MOISTURE
PLASTIC LIMIT — LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD P-1

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: May 29, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				
		Brown/orange fine-grained silty SAND (SM)				
		Orange fine-grained clayey SAND (SC)				
5		Boring Terminated at 5 ft.				
10						
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD P-2

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: May 29, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				
		Brown/orange fine-grained silty SAND (SM)				
		Orange fine-grained clayey SAND (SC)				
5		Boring Terminated at 5 ft.				
10						
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD P-3

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: May 29, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				
		Brown/orange fine-grained silty SAND (SM)				
		Orange fine-grained clayey SAND (SC)				
5		Boring Terminated at 5 ft.				
10						
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD P-4

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: May 29, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 3 inches)				
		Brown/orange fine-grained silty SAND (SM)				
		Orange fine-grained clayey SAND (SC)				
5		Boring Terminated at 5 ft.				
10						
15						
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD R-1

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: June 26, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Dark orange fine-grained silty SAND (SM)				
5						
		Orange fine-grained silty/clayey SAND (SM/SC)				
10						
15		Boring Terminated at 15 ft.				
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

NOVA

TEST BORING RECORD R-2

PROJECT: Okaloosa County Tax Collector | PROJECT NO.: 10116-2024095
CLIENT: DAG Architects, Inc.
PROJECT LOCATION: Crestview, Okaloosa County, Florida
LOCATION: Per Boring Location Plan | ELEVATION: Existing Grade
DRILLER: B. Keever | LOGGED BY: E. Sharpe
DRILLING METHOD: Auger Boring | DATE: June 26, 2024
DEPTH TO - WATER> INITIAL: GNE | AFTER 24 HOURS: | CAVING>

Depth (feet)	Elevation (ft-MSL)	Description	Graphic	Groundwater	Sample Type	N-Value
0		TOPSOIL (Approx. 6 inches)				
		Dark orange fine-grained silty SAND (SM)				
5						
		Orange fine-grained silty/clayey SAND (SM/SC)				
10						
15		Boring Terminated at 15 ft.				
20						
25						
30						
35						

■ %<#200
● BLOW COUNT
▲ NATURAL MOISTURE
PLASTIC LIMIT ⊢——⊣ LIQUID LIMIT
10 20 30 40 50 70 90

This information pertains only to this boring and should not be interpreted as being indicative of the site.

APPENDIX C
Laboratory Data

SUMMARY OF CLASSIFICATION & INDEX TESTING

Okaloosa County Tax Collector
Crestview, Okaloosa County, Florida
NOVA Project Number 10116-2024095

SUMMARY OF CLASSIFICATION AND INDEX TESTING						
Boring No.	Sample Depth (ft. BEG)	Natural Moisture (%)	Percent Fines (- #200)	Hydraulic Conductivity		USCS Soil Classification
				K_{vs} (ft/day)	Unit Weight of Sample (pcf)	
B-1	2-4	11	30	---	---	SC
B-1	13-15	13	30	---	---	SC
B-2	8-10	15	42	---	---	SC
B-3	28-30	21	68	---	---	CL
B-4	23-25	5	5	---	---	SP
B-7	18-20	18	42	---	---	SP
P-1	3-5	10	29	---	---	SC
P-3	1-3	6	17	---	---	SM
R-1	0.5-8	9	15	0.4	113	SM

REMOLDED LABORATORY PERMEABILITY TEST DATA SHEET

PROJECT: Okaloosa County Tax Collector

NOVA PROJECT #: 10116-2024095

DATE: 7/10/2024

ASSIGNED BY: JAJ

TESTED BY: ELHS

Sample LOCATION / BORING NO.	R-1
Sample NUMBER / DEPTH	0.5 ft. - 8 ft.

PERMEABILITY TESTING SUMMARY			
PERMEABILITY (K_V)	→	0.4	ft/day
Corresponding K_h	→	1	ft/day
DRY DENSITY	→	113	lbs/ft^3
MOISTURE CONTENT	→	9	%
-200 FINES CONTENT	→	15	%

FALLING HEAD PERMEABILITY (ASTM D 5084)

No. of LAYERS:	3	Wt. of MOLD (lbs):	4.48
BLOWS/LAYER:	15	Wt. of MOLD/SOIL (lbs):	8.59

HEIGHT (FT)	TRIAL #1 (SEC)	PERMEABILITY
7	0.0	1.66E-04
6	65.7	1.20E-04
5	185.5	8.59E-05
4	434.2	1.29E-04
3	779.3	1.88E-04
2	977.6	
1	1169.1	
	1.4E-04	cm/sec

MOISTURE CONTENT (ASTM D 2216)

Pan NUMBER	T
Wt. of WET SOIL & PAN (g)	247.1
Wt. of DRY SOIL & PAN (g)	232.0
Wt. of PAN (g)	66.1
Wt. of Water (g)	15.1
Wt. of Dry Soil (g)	165.9
MOISTURE CONTENT (%)	9.1

-200 SIEVE WASH (ASTM D 1140)

Pan NUMBER	T
Wt. of DRY SOIL & PAN (g)	232.0
Wt. of WASH SOIL & PAN (g)	206.6
Wt. of PAN (g)	66.1
Wt. of Original Dry Sample (g)	165.9
Wt. of -200 Material (g)	25.4
Wt. of Washed Dry Sample (g)	140.5
-200 FINES CONTENT (%)	15.3

NUMBER OF INCHES MOLD WAS SHORT? 0.000 INCHES (ZERO INCHES IS DEFAULT)

PERMEABILITY CONSTANT USED WAS → 0.23 (Includes 3/8"ID tubing)

NOVA

LABORATORY TESTING

A laboratory testing program was conducted to characterize materials which exist at the site using the recovered samples. Selected test data are presented on the Test Boring Records attached in the Appendix. The specific tests are briefly described below. All soil samples will be properly disposed of 30 days following the submittal of this NOVA subsurface exploration report unless you request otherwise.

SOIL CLASSIFICATION

Soil classification provides a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our explorations, samples obtained during drilling operations are observed in our laboratory and visually classified by an engineer. The soils are classified according to consistency, color and texture. These classification descriptions are included on our Test Boring Records. The classification system discussed above is primarily qualitative; laboratory testing is generally performed for detailed soil classification. Using the test results, the soils were classified using the Unified Soil Classification System. This classification system and the in-place physical soil properties provide an index for estimating the soil's behavior.

MOISTURE CONTENT

The moisture content is the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles and was conducted in general accordance with ASTM D-2216.

PERCENT FINES

The percent fines is defined as the percentage of the total dry soil mass which passes a #200 sieve. This test was conducted in general accordance with ASTM D-1140.

FALLING-HEAD LABORATORY PERMEABILITY TEST

A remolded falling head permeability test (ASTM D-5084) is a common laboratory test used to determine the hydraulic conductivity of fine-grained soils. The test involves the flow of water through a re-molded, fully-saturated soil sample inside of a rigid-wall permeameter connected to a standpipe of constant diameter. Before beginning the flow measurements, the soil sample is saturated and the standpipe is filled with water to a given level. The test then starts by allowing the water to flow through the sample until the water in the standpipe reaches the lower limit. The time required for the water to flow from the upper to the lower limit is recorded.

DOCUMENT 00 31 43 - PERMIT APPLICATION

1.1 PERMIT APPLICATION INFORMATION

A. This Document is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. Find appropriate forms online at:

https://cityofcrestview.org/161/Building-Permits-Inspections

B. Permit Application: Complete building permit application and file with authorities having jurisdiction within five (5) days of the date of execution of the Contract. Plan review and building permit fees shall be paid for by the Owner. Contractor shall apply and pay for trade permits.

C. Utility Impact and Service Tap Fees: Impact & Tap fees shall be paid by the owner.

END OF DOCUMENT 00 31 43

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DOCUMENT 00 41 23 - BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)
ITB PW 26-25

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 CERTIFICATIONS AND BASE BID

A. BIDDER accepts all of the terms and conditions of the Instructions to BIDDERs, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that BIDDER may agree to in writing upon request of OWNER.

B. Base Bid, Single-Prime (All-Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by DAG Architects, Inc. and the Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of above-named Project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. _____ Dollars ($_____).
2. The above amount may be modified by amounts indicated by the Bidder on the attached Bid Supplement - Alternates and Bid Supplement - Unit Prices.

1.3 BID GUARANTEE

A. A Bid must be accompanied by Bid Security made payable to OWNER in an amount of 5% of BIDDER's maximum Bid price and in the form of a cashier's check or a Bid Bond on the form attached issued by a surety meeting the requirements of Article 11 of the AIA A201-2017 General Conditions.

B. A copy of the Bid Security shall be uploaded with their bid. The original Bid Security shall be delivered to the Issuing Office (c/o DeRita Mason, Okaloosa County Purchasing Department, 5479A Old Bethel Road,

Crestview, FL 32536) within five business days from the date set forth to receive bids. Failure to deliver the Bid Security within the five-business day window may cause the Bid to be declared non-responsive.

1.4 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:
1. Demolition
2. Earthwork
3. Paving & Grading
4. Storm Sewer
5. Sanitary Sewer
6. Landscaping
7. Utilities
8. Site Lighting
9. Concrete Work
10. Masonry Work
11. Structural Steel Framing
12. Insulation
13. Roofing Work
14. Doors, Windows and Storefronts
15. Exterior Finishes
16. Drywall
17. Interior Finishes
18. Painting
19. Plumbing Work
20. Fire Protection
21. Mechanical Work
22. Electrical Work

B. The above brief list does not preclude, or limit scope of work shown and as described in each perspective specification section and/or in each construction drawing in this Project Manual. All scope of work depicted shall be included in contract unless specifically excluded in writing in from the Architect or unless indicated otherwise. See specification section “00 73 00 Supplementary Conditions” for further clarifications.

1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete the Work within 425 calendar days. Applicable liquidated damages are the amounts established in the following schedule:

Original Contract Amount	Daily Charge Per Calendar Day
$299,999 and under	$904
$300,000 but less than $2,000,000	$1,685
$2,000,000 but less than $5,000,000	$2,667
$5,000,000 but less than $10,000,000	$3,813
$10,000,000 but less than $20,000,000	$5,021
$20,000,000 but less than $40,000,000	$7,442
$40,000,000 and over……	$10,224 plus 0.00005 of any amount over $40 million (Round to the nearest whole dollar)

1.6 BID SUPPLEMENTS & ATTACHMENTS

A. The following supplements are a part of this Bid Form and are attached hereto:

1. Bid Form Supplement - Alternates.
2. Bid Form Supplement - Unit Prices.
3. Bid Form Supplement - Allowances.
4. Bid Form Supplement - Bid Bond Form (AIA Document A310-2010).
5. RESPONSE DOCUMENT #1: DRUG-FREE WORKPLACE CERTIFICATION
6. RESPONSE DOCUMENT #1: DRUG-FREE WORKPLACE CERTIFICATION
7. RESPONSE DOCUMENT #2: CONFLICT OF INTEREST DISCLOSURE FORM
8. RESPONSE DOCUMENT #3: FEDERAL E-VERIFY COMPLIANCE CERTIFICATION
9. RESPONSE DOCUMENT #4: CONE OF SILENCE FORM
10. RESPONSE DOCUMENT #5: INDEMNIFICATION AND HOLD HARMLESS
11. RESPONSE DOCUMENT #6: ADDENDUM ACKNOWLEDGEMENT
12. RESPONSE DOCUMENT #7: COMPANY DATA
13. RESPONSE DOCUMENT #8: LIST OF REFERENCES
14. RESPONSE DOCUMENT #9: SWORN STATEMENT – PUBLIC ENTITY CRIMES
15. RESPONSE DOCUMENT #10: VENDORS ON SCRUTINIZED COMPANIES LIST
16. RESPONSE DOCUMENT #11: GRANT FUNDED CLAUSES
17. RESPONSE DOCUMENT #12: EMPLOYMENT COMPLIANCE
18. RESPONSE DOCUMENT #14: ANTI-COLLUSION STATEMENT
19. RESPONSE DOCUMENT #15: ANTI-HUMAN TRAFFICKING AFFIDAVIT
20. RESPONSE DOCUMENT #16: ITB RESPONDENT'S ACKNOWLEDGEMENT (pg. 1)
21. RESPONSE DOCUMENT #17: CERTIFICATE OF GOOD STANDING FOR THE STATE OF FLORIDA-
    PROVIDED BY CONTRACTOR – see above* (vendor provided form)

B. The following documents shall be submitted with the bid packet. Failure to provide required forms may result in contractor disqualification.

1.7 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in State of Florida and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.8 DEFINED TERMS

A. The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to BIDDERs, the General Conditions, and the Supplementary Conditions.

1.9 GRANT DIRECTIVES

A. Contractor Purchased Equipment for State or Local Ownership

1. The Contractor shall not purchase any equipment for state or local ownership.

B. Local / State Hiring Preference

1. No local / state hiring preferences shall be used.

C. Public Agencies in Competition with the Private Sector

1. No public agency shall be permitted to bid in competition or to enter into subcontract with private contractors.

D. Publicly Owned Equipment

1. Publicly owned equipment shall not compete with privately owned equipment on this contract.

1.10 SUBMISSION OF BID

A. Respectfully submitted this ____ day of _____, 2025.

Bidder: Indicate correct name of bidding entity:

_____

By:
Signature: _____
Printed name: _____
(If BIDDER is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
Signature: _____
Printed name: _____

Title: _____
Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name: _____
Contact Phone Number: _____
Contact Email Address: _____
Federal ID or SS Number: _____

Bidder's License No.: _____

DUNS Number: _____

CAGE Code: _____

Affix corporate seal here:

RESPONSE DOCUMENT #1: DRUG-FREE WORKPLACE CERTIFICATION

THE BELOW SIGNED RESPONDENT CERTIFIES that it has implemented a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3. Give each employee engaged in providing the commodities or contractual services that are under quote a copy of the statement specified in subsection 1.

4. In the statement specified in subsection 1, notify the employees that, as a condition of working on the commodities or contractual services that are under quote, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893, Florida Statutes, or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Impose a sanction on, or require the satisfactory participation in, drug abuse assistance or rehabilitation program if such is available in employee's community, by any employee who is convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

DATE:	_____	SIGNATURE:	_____
COMPANY:	_____	NAME:	_____
ADDRESS:	_____		(TYPED OR PRINTED)
	_____		_____
	_____	TITLE:	_____
	_____		_____
PHONE #:	_____	E-MAIL:	_____

RESPONSE DOCUMENT #2: CONFLICT OF INTEREST DISCLOSURE FORM

For purposes of determining any possible conflict of interest, all Respondents, must disclose if any Okaloosa Board of County Commissioner, employee(s), elected officials(s), or if any of its agencies is also an owner, corporate officer, agency, employee, etc., of their business.

Indicate either "yes" (a county employee, elected official, or agency is also associated with your business), or "no." If yes, give person(s) name(s) and position(s) with your business.

YES: _____ NO: _____

NAME(S) POSITION(S)

_____

_____

_____

_____

_____

FIRM NAME: _____

BY (PRINTED): _____

BY (SIGNATURE): _____

TITLE: _____

ADDRESS: _____

_____

PHONE NUMBER: _____

E-MAIL: _____

DATE: _____

RESPONSE DOCUMENT #3: FEDERAL E-VERIFY COMPLIANCE CERTIFICATION

Enrollment and verification requirements.

(1) If the Contractor is not enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall-

a. Enroll. Enroll as a Federal Contractor in the E-Verify Program within thirty (30) calendar days of contract award;

b. Verify all new employees. Within ninety (90) calendar days of enrollment in the E-Verify program, begin to use E-Verify to initiate verification of employment eligibility of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); and,

c. Verify employees assigned to the contract. For each employee assigned to the contract, initiate verification within ninety (90) calendar days after date of enrollment or within thirty (30) calendar days of the employee's assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)

(2) If the Contractor is enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall use E-Verify to initiate verification of employment eligibility of

a. All new employees.

i. Enrolled ninety (90) calendar days or more. The Contractor shall initiate verification of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); or

b. Enrolled less than ninety (90) calendar days. Within ninety (90) calendar days after enrollment as a Federal Contractor in E-Verify, the Contractor shall initiate verification of all new hires of the contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section; or

i. Employees assigned to the contract. For each employee assigned to the contract, the Contractor shall initiate verification within ninety (90) calendar days after date of contract award or within thirty (30) days after assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)

(3) If the Contractor is an institution of higher education (as defined at 20 U.S.C. 1001(a)); a State of local government or the government of a Federally recognized Indian tribe, or a surety performing under a takeover agreement entered into with a Federal agency pursuant to a performance bond, the Contractor may choose to verify only employees assigned to the contract, whether existing employees or new hires. The Contractor shall follow the applicable verification requirements of (b)(1) or (b)(2), respectively, except that any requirement for verification of new employees applies only to new employees assigned to the contract.

(4) Option to verify employment eligibility of all employees. The Contractor may elect to verify all existing employees hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), rather than just those employees assigned to the contract. The Contractor shall initiate verification for each existing employee working in the United States who was hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), within one hundred eighty (180) calendar days of-

i. Enrollment in the E-Verify program; or

ii. Notification to E-Verify Operations of the Contractor's decision to exercise this option, using the contract information provided in the E-Verify program Memorandum of Understanding (MOU)

(5) The Contractor shall comply, for the period of performance of this contract, with the requirements of the E-Verify program MOU.

i. The Department of Homeland Security (DHS) or the Social Security Administration (SSA) may terminate the Contractor's MOU and deny access to the E-Verify system in accordance with the terms of the MOU. In such case, the Contractor, will be referred to a suspension or debarment official.

ii. During the period between termination of the MOU and a decision by the suspension or debarment official whether to suspend or debar, the contractor is excused from its obligations under paragraph (b) of this clause. If the suspension or debarment official determines not to suspend or debar the Contractor, then the Contractor must reenroll in E-Verify.

iii. Web site. Information on registration for and use of the E-Verify program can be obtained via the Internet at the Department of Homeland Security Web site: http://www.dhs.gov/E-Verify.

Individuals previously verified. The Contractor is not required by this clause to perform additional employment verification using E-Verify for any employee-

(a) Whose employment eligibility was previously verified by the Contractor through the E-Verify program;

(b) Who has been granted and holds an active U.S. Government security clearance for access to confidential, secret, or top secret information in accordance with the National Industrial Security Program Operating Manual; or

(c) Who has undergone a completed background investigation and been issued credentials pursuant to Homeland Security Presidential Directive (HSPD)-12. Policy for a Common Identification Standard for Federal Employees and Contractors.

Subcontracts. The Contractor shall include the requirements of this clause, including this paragraph € (appropriately modified for identification of the parties in each subcontract that-

(1) Is for-(i) Commercial and noncommercial services (except for commercial services that are part of the purchase of a COTS item (or an item that would be a COTS item, but for minor modifications), performed by the COTS provider, and are normally provided for that COTS item); or

(ii) Construction;

(2) Has a value of more than $3,500; and

(3) Includes work performed in the United States.

In accordance with Okaloosa County Policy and Executive Order Number 11-116 from the office of the Governor of the State of Florida, Respondent hereby certifies that the U.S. Department of Homeland Security's E-Verify system will be used to verify the employment eligibility of all new employees hired by the Respondent during the contract term, and shall expressly require any subcontractors performing work or providing services pursuant to the contact to likewise utilize the U.S. Department of Homeland Securities E-Verify system to verify the employment eligibility of all

new employees hired by the subcontractor during the contract term; and shall provide documentation such verification to the COUNTY upon request.

As the person authorized to sign this statement, I certify that this company complies/will comply fully with the above requirements.

DATE:	_____	SIGNATURE:	_____
COMPANY:	_____	NAME:	_____
ADDRESS:	_____	TITLE:	_____
	_____		
	_____		
E-MAIL:	_____		
PHONE #:	_____		

RESPONSE DOCUMENT #4: CONE OF SILENCE FORM

The Board of County Commissioners have established a solicitation silence policy (Cone of Silence) that prohibits oral and written communication regarding all formal solicitations for goods and services (ITB, RFP, ITQ, ITN, and RFQ) or other competitive solicitation between the bidder (or its agents or representatives) or other entity with the potential for a financial interest in the award (or their respective agents or representatives) regarding such competitive solicitation, and any County Commissioner or County employee, selection committee member or other persons authorized to act on behalf of the Board including the County's Architect, Engineer or their sub-consultants, or anyone designated to provide a recommendation to award a particular contract, other than the Purchasing Department Staff.

The period commences from the time of advertisement until contract award.

Any information thought to affect the committee or staff recommendation submitted after bids are due, should be directed to the Purchasing Manager or an appointed representative. It shall be the Purchasing Manager's decision whether to consider this information in the decision process.

Any violation of this policy shall be grounds to disqualify the Respondent from consideration during the selection process.

All Respondents must agree to comply with this policy by signing the following statement and including it with their submittal.

I, _____ representing _____
_____
Signature Company Name
on this _____ day of _____ 2025, I hereby agree to abide by the County's "Cone of Silence Clause" and understand violation of this policy shall result in disqualification of my proposal/submittal.

RESPONSE DOCUMENT #5: INDEMNIFICATION AND HOLD HARMLESS

CONTRACTOR shall indemnify and hold harmless COUNTY, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the CONTRACTOR and other persons employed or utilized by the CONTRACTOR in the performance of this Agreement.

Proposer's Company Name	Authorized Signature – Manual
Physical Address	Authorized Signature – Typed
Mailing Address	Title
Phone Number	FAX Number
Cellular Number	After-Hours Number(s)
Date	

RESPONSE DOCUMENT #6: ADDENDUM ACKNOWLEDGEMENT
ITB PW 26-25

Acknowledgment is hereby made of the following addenda (identified by number) received since issuance of solicitation:

ADDENDUM NO.	DATE

NOTE: Prior to submitting the response to this solicitation, it is the responsibility of the respondent to confirm if any addenda have been issued. If such addenda have been issued, acknowledge receipt by noting number(s) and date(s) above.

RESPONSE DOCUMENT #7: COMPANY DATA

Respondent's Company Name: _____

Physical Address & Phone #: _____

_____

_____

_____

_____

Contact Person (Typed-Printed): _____

Phone #: _____

Cell #: _____

Federal ID or SS #: _____

DUNNS/SAM UEI#: _____

Respondent's License #: _____

Additional License – Trade and Number _____

Fax #: _____

Emergency #'s After Hours,
Weekends & Holidays: _____

DBE/Minority Number: _____

RESPONSE DOCUMENT #8: LIST OF REFERENCES

1. Owner's Name and Address:_____

_____

Contact Person:_____Telephone # (_____) _____

*Email:_____

2. Owner's Name and Address:_____

_____

Contact Person:_____Telephone # (_____) _____

*Email:_____

3. Owner's Name and Address:_____

_____

Contact Person:_____Telephone # (_____) _____

*Email:_____

4. Owner's Name and Address:_____

_____

Contact Person:_____Telephone # (_____) _____

*Email:_____

5. Owner's Name and Address:_____

_____

Contract Person:_____Telephone # (_____) _____

*Email:_____

RESPONSE DOCUMENT #9: SWORN STATEMENT UNDER SECTION 287.133 (3) (a), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted for _____
2. This sworn statement is submitted by _____

whose business address is: _____ and (if applicable) its Federal Employer Identification Number (FEIN) is (If entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____

3. My name is_____and my relationship to the entity named above is _____

4. I understand that a "public entity crime" as defined in Section 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

5. I understand that "convicted" or "conviction" as defined in Section 287.133 (1) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without adjudication of guilt, in any federal or state trial court of record, relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

6. I understand that an "affiliate" as defined in Section 287.133(1) (a), Florida Statutes, means:

(1) A predecessor or successor of a person convicted of a public entity crime; or
(2) An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

7. I understand that a "person" as defined in Section 287.133(1) (e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

8. Based on information and belief, that statement which I have marked below is true in relation to the entity submitting this sworn statement. [Please indicate which statement applies.]

____ Neither the entity submitting this sworn statement, nor one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the

management of the entity, nor any affiliate of the entity, has been charged with and convicted of public entity crime subsequent to July 1, 1989.

____ There has been a proceeding concerning the conviction before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer did not place the person or affiliate on the convicted vendor list. [Please attach a copy of the Final Order.]

____ The person or affiliate was placed on the convicted vendor list. There has been a subsequent proceeding before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in the public interest to remove the person or affiliate from the convicted vendor list. [Please attach a copy of the Final Order.]

____ The person or affiliate has not been placed on the convicted vendor list. [Please describe any action taken by or pending with the Department of General Services.]

Date:_____Signature: _____

STATE OF: _____

COUNTY OF: _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority, who after first being sworn by me, affixed his/her signature in the space provided above on this __ day of _____, in the year_____.

My commission expires:

_____
Notary Public

_____
Print, Type, or Stamp of Notary Public

Personally known to me, or Produced Identification:

_____
Type of ID

RESPONSE DOCUMENT #10: VENDORS ON SCRUTINIZED COMPANIES LISTS

By executing this Certificate_____, the bid proposer, certifies that it is not: (1) listed on the Scrutinized Companies that Boycott Israel List, created pursuant to section 215.4725, Florida Statutes, (2) engaged in a boycott of Israel, (3) listed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to section 215.473, Florida Statutes, or (4) engaged in business operations in Cuba or Syria. Pursuant to section 287.135(5), Florida Statutes, the County may disqualify the bid proper immediately or immediately terminate any agreement entered into for cause if the bid proposer is found to have submitted a false certification as to the above or if the Contractor is placed on the Scrutinized Companies that Boycott Israel List, is engaged in a boycott of Israel, has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria, during the term of the Agreement. If the County determines that the bid proposer has submitted a false certification, the County will provide written notice to the bid proposer. Unless the bid proposer demonstrates in writing, within 90 calendar days of receipt of the notice, that the County's determination of false certification was made in error, the County shall bring a civil action against the bid proposer. If the County's determination is upheld, a civil penalty shall apply, and the bid proposer will be ineligible to bid on any Agreement with a Florida agency or local governmental entity for three years after the date of County's determination of false certification by bid proposer.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

DATE: _____

COMPANY: _____

ADDRESS: _____

_____

_____

_____

PHONE NO.: _____

SIGNATURE: _____

NAME: _____
(Typed or Printed)

TITLE:_____

E-MAIL: _____

RESPONSE DOCUMENT #11: GRANT FUNDED CLAUSES

This Exhibit is hereby incorporated by reference into the main *Procurement*.

PROVISIONS RELATED TO GRANT FUNDS THAT FUND THE SERVICES AND GOODS UNDER THIS *SOLICITATIO*N

This *solicitation* is fully State funded by the Florida Department of Environmental Protection. Respondents shall comply with the clauses, as enumerated below, in accordance with State and Federal law. *Proposer* shall adhere to all grant conditions set forth as the requirements of the grant funding. Including, but not limited to, those set forth below, as there are others included in this invitation to bid, which are incorporated herein by reference:

a. 2 CFR Part 170 (including Appendix A), 180, 200 (including Appendixes), and 3000
b. Executive Orders 12549 and 12689
c. 41 CFR s. 60-1(a) and (d)
d. Consolidated Appropriations Act, 2021, Public Law 116-260 related to salary limitations.

These cited regulations are hereby incorporated and made part of this *Solicitation* as if fully set forth herein. As stated above, this list is not all inclusive, any other requirement of law applicable in accordance with the Federal, State or grant requirements are also applicable and hereby incorporated into this *Solicitation*. If Proposer cannot adhere to or objects to any of the applicable federal requirements, Proposers proposal may be deemed by the County as unresponsive. The provisions in this exhibit are supplemental and in addition to all other provisions within the p*rocurement.* In the event of any conflict between the terms and conditions of this Exhibit and the terms and conditions of the remainder of the p*rocurement*, the conflicting terms and conditions of this Exhibit shall prevail. However, in the event of any conflict between the terms and conditions of this Exhibit and the terms and conditions of any federal grant funding document provided specific to the funds being used to contract services or goods under this *Procurement* the conflicting terms and conditions of that document shall prevail.

Drug Free Workplace Requirements (Drug-Free Workplace Act of 1988 (41 U.S.C. § 701 et seq.), 2 CFR § 182): Applicability: As required in the Drug-free workplace requirements in accordance with Drug Free Workplace Act of 1988 (Pub l 100-690, Title V, Subtitle D). Requirement: to the extent applicable, *propose*r must comply with Federal Drug Free workplace requirements as Drug Free Workplace Act of 1988.

Conflict of Interest (2 CFR § 200.112): Applicability: Any federal grant funded Contract or Contract that may receive federal grant funds. Requirement: The *proposer* must disclose in writing any potential conflict of interest to the County or pass-through entity in accordance with applicable Federal policy. Further, the County is required to maintain conflict of interest policies as it relates to procured contracts. In accordance with the Okaloosa County Purchasing Manual section 41.05(8), a conflict of interest exists when and of the following occur: i. Because of other activities, relationships, or contracts, a *proposer* is unable, or potentially unable, to render impartial assistance or advice; ii. A *proposer*'s objectivity in performing the contract work is or might be otherwise impaired; or iii. The *proposer* has an unfair competitive advantage.

Mandatory Disclosures (31 U.S.C. §§ 3799 – 3733): Applicability: All Contracts using federal grants funds, or which may use federal grant funds. Requirement: *proposer* acknowledges that 31 U.S.C. Chapter 38 (Administrative Remedies for False Claims and Statements) applies to the *proposer*'s actions pertaining to this *solicitation*. The contractor must disclose in writing all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award.

Utilization of Minority and Women Firms (M/WBE) (2 CFR § 200.321): Applicability: All federally grant funded Contracts or Contracts which may use federal grant funds. Requirement: The *proposer* must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible, in accordance with 2CFR 200.321. If subcontracts are to be let, prime *proposer* will require compliance by all sub-contractors. Prior to contract award, the *proposer* shall document efforts to utilize M/WBE firms including what firms were solicited as suppliers and/or subcontractors as applicable and submit this information with their bid submittal. Information regarding certified M/WBE firms can be obtained from:

Florida Department of Management Services (Office of Supplier Diversity)
Florida Department of Transportation
Minority Business Development Center in most large cities and

Local Government M/DBE programs in many large counties and cities

Equal Employment Opportunity (As per 2 CFR Part 200, Appendix II(C); 41 CFR § 61-1.4; 41 CFR § 61-4.3; Executive Order 11246 as amended by Executive Order 11375): Applicability: except as otherwise provided under 41 CFR Part 60, applies to all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3. Requirement: During the performance of this Contract, the *proposer* agrees as follows: (1) The *Proposer* will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The *Proposer* will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identify, 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 Proposer agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause; (2) The *Proposer* will, in all solicitations or advertisements for employees placed by or on behalf of the *Proposer*, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin; (3) The *Proposer* will send to each labor union or representative of workers with which it has a collective bargaining Contract or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the *Proposer*'s commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment; (4) The *Proposer* will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor; (5) The *Proposer* will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.; (6) In the event of the *Proposer*'s noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Proposer may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.; (7) *Proposer* will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The *Proposer* will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a *Proposer* becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the *Proposer* may request the United States to enter into such litigation to protect the interests of the United States.

Contract Work Hours and Safety Standards Act (40 U.S.C. 3701–3708 as supplemented by 29 CFR Part 5): Applicability: All contracts awarded in excess of $100,000 that involve the employment of mechanics or laborers. Requirement: All contracts awarded in excess of $100,000 that involve the employment of mechanics or laborers must be in compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor is required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions, which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

Clean Air Act (42 U.S.C. 7401–7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251–1387, as amended): Applicability: Contracts and subgrants of amounts in excess of $150,000.00. Requirement: *proposer* agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401–7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251–1387).

Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

Debarment and Suspension (2 CFR part 180, Executive Orders 12549 and 12689): Requirement: *proposer* certifies that it and its principals, if applicable, are not presently debarred or suspended by any Federal department or agency from participating in this transaction. *Proposer* now agrees to verify, to the extent applicable that for each lower tier subcontractor that exceeds $25,000 as a "covered transaction" under the Services to be provided is not presently disbarred or otherwise disqualified from participating in the federally assisted services. The *proposer* agrees to accomplish this verification by: (1) Checking the System for Award Management at website: http://www.sam.gov; (2) Collecting a certification statement similar to the Certification of Offeror /Bidder Regarding Debarment, herein; (3) Inserting a clause or condition in the covered transaction with the lower tier contract.

Access to Records and Reports: Applicability: All Contractors Requirement: Pursuant to Section 20.055(5), F.S., *Proposer* will make available to the County's granting agency, the granting agency's Office of Inspector General, the Government Accountability Office, the Comptroller General of the United States, Okaloosa County, Okaloosa County Clerk of Court's Inspector General, or any of their duly authorized representatives any books, documents, papers or other records, including electronic records, of the contractor that are pertinent to the County's grant award, in order to make audits, investigations, examinations, excerpts, transcripts, and copies of such documents. The right also includes timely and reasonable access to the contractor's personnel during normal business hours for the purpose of interview and discussion related to such documents. This right of access shall continue as long as records are retained and this requirement, shall be imposed, in writing, on its subcontractors, respectively.

Record Retention (2 CFR § 200.33): Applicability: Contractor shall maintain books, records and documents directly pertinent to performance under this Agreement in accordance with United States generally accepted accounting principles (US GAAP) consistently applied. Florida Department of Environmental Protection, the State, or their authorized representatives shall have access to such records for audit purposes during the term of this Agreement and for five (5) years following the completion date or termination of the Agreement. In the event that any work is subcontracted, Contractor shall similarly require each subcontractor to maintain and allow access to such records for audit purposes. Upon request of Department's Inspector General, or other authorized State official, the Contractor shall provide any type of information the Inspector General deems relevant to Contractor's integrity or responsibility. Such information may include, but shall not be limited to, Grantee's business or financial records, documents, or files of any type or form that refer to or relate to Agreement. The Grantee shall retain such records for the longer of: (1) three years after the expiration of the Agreement; or (2) the period required by the General Records Schedules maintained by the Florida Department of State (available at: https://dos.fl.gov/library-archives/records-management/general-records-schedules/).

Termination for Default (Breach or Cause): Applicability: All Contracts that may receive federal funds or that are federally funded above the micro-purchase amount. Requirement: If Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, the County may terminate the contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract.

Termination for Convenience: Applicability: All Contracts that may receive federal funds or that are federally funded above the micro-purchase amount. Requirement: *Any Awarded Contract* may be terminated by Okaloosa County in whole or in part at any time, upon ten (10) days written notice. If the Contract is terminated before performance is completed, the *Contractor* shall be paid only for that work satisfactorily performed for which costs can be substantiated.

Safeguarding Personal Identifiable Information (2 CFR § 200.82): Requirement: *proposer* will take reasonable measures to safeguard protected personally identifiable information and other information designated as sensitive by the awarding agency or is considered sensitive consistent with applicable Federal, state and/or local laws regarding privacy and obligations of confidentiality.

Prohibition On Utilization Of Cost Plus A Percentage Of Cost Contracts (2 CFR Part 200): Requirement: The County will not award contracts on a cost-plus percentage of cost basis.

Energy Policy and Conservation Act (43 U.S.C. § 6201 and 2 CFR Part 200 Appendix II (H): Applicability: For any contracts except micro-purchases ($3000 or less, except for construction contracts over $2000). Requirement: *proposer* shall comply with mandatory standards and policies relating to energy efficiency, stating in the state energy conservation plan issued in compliance with the Energy Policy and Conservation act. (Pub. L. 94-163, 89 Stat. 871) [53 FR 8078, 8087, Mar. 11, 1988, as amended at 60 FR 19639, 19645, Apr. 19, 1995].

Compliance with Federal, State and Local Laws: The Proposer and all its agents shall comply with all federal, state and local regulations, including, but not limited to, nondiscrimination, wages, social security, workers' compensation, licenses, and registration requirements.

RESPONSE DOCUMENT #11: GRANT FUNDED CLAUSES

The _____ on behalf of _____ the *proposer* is authorized to sign below and confirm the *proposer* is fully able to comply with these requirements, federal terms and conditions and has made any inquiries and/or further examination of the law and requirements as is necessary to comply.

DATE: _____ SIGNATURE: _____

COMPANY: _____ NAME: _____

ADDRESS: _____ TITLE: _____

_____

_____

E-MAIL: _____

PHONE NO.: _____

RESPONSE DOCUMENT #12: EMPLOYMENT COMPLIANCE

Title VI Clauses for Compliance with Nondiscrimination Requirements

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes contractors) will comply with the Title VI List of Pertinent Nondiscrimination Acts And Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts And Authorities on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its FACILITY as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts And Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

    a. Withholding payments to the contractor under the contract until the contractor complies; and/or

    b. Cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), The contractor and any subcontractor shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin, as implemented by the Department of the Treasury’s Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with “Limited English Proficiency” in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury’s Title VI regulations, 31 CFR Part 22, and herein incorporated by reference and made a part of this contract or agreement.;
- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- The Fair Housing Act, Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 et seq.), which prohibits discrimination in housing on the basis of race, color, religion, national origin, sex, familial status, or disability;
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability under programs, activities, and services provided or made available by state and local governments or instrumentalities or agencies as amended (42 U.S.C. §§ 12101 et seq. and/or in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The *contractor* has full responsibility to monitor compliance to the referenced statute or regulation. The contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

As the person authorized to sign this statement, I certify that this firm intends to fully comply with the above employment requirements.

_____	_____
Bidder's Company Name	Authorized Signature – Manual
_____	_____
Address	Authorized Signature – Typed
_____	_____
Address	Title
_____	_____
Phone #	Fax #
_____	
Federal ID # or SS #	

Date Submitted: _____

RESPONSE DOCUMENT #14-ANTI-COLLUSION STATEMENT

ANTI-COLLUSION STATEMENT: The below signed bidder has not divulged to, discussed or compared his bid with other bidders and has not **colluded with any other bidder or parties to bid whatever. Note: No premiums, rebates, or gratuities permitted either with, prior to, or after any** delivery of materials. Any such violation will result in the cancellation and/or return of material (as applicable) and the removal from bid list(s).

_____	_____
Bidder's Company Name	Authorized Signature – Manual
_____	_____
Address	Authorized Signature – Typed
_____	_____
Address	Title
_____	_____
Phone #	Fax #
_____	
Federal ID # or SS #	

Date Submitted: _____

RESPONSE DOCUMENT #15: ANTI-HUMAN TRAFFICKING AFFIDAVIT

DIRECTIONS: *All nongovernmental entities that are or potentially will be contracting, renewing or extending contracts with Okaloosa County, must have an officer or representative fully execute this affidavit. Note, this is a mandatory requirement of s 787.06(13), Florida Statutes effective July 1, 2024.*

I _____ (insert name) as _____ (insert title) on behalf of _____ (insert entity name) under penalty of perjury hereby attest as follows:

1. I am over 21 years of age and have personal knowledge of the matters set forth in this affidavit.
2. _____ (insert entity name) does not use coercion for labor or services as defined in s. 787.06(2)(a), Florida Statutes.
3. More particularly, _____ (insert entity name) does not participate in any of the following actions:
   a. Using or threatening to use physical force against any person;
   b. Restraining, isolating or confining or threatening to restrain, isolate or confine any person without lawful authority and against her or his will;
   c. Using lending or other credit methods to establish a debt by any person when labor or services are pledged as a security for the debt, if the value of the labor or services as reasonably assessed is not applied toward the liquidation of the debt or the length and nature of the labor or services are not respectively limited and defined;
   d. Destroying, concealing, removing, confiscating, withholding, or possessing any actual or purported passport, visa, or other immigration document, or any other actual or purported government identification document, of any person;
   e. Causing or threatening to cause financial harm to any person;
   f. Enticing or luring any person by fraud or deceit; or
   g. Providing a controlled substance as outlined in Schedule I or Schedule II of s. 893.03, Florida Statutes to any person for the purpose of exploitation of that person.

FURTHER AFFIANT SAYETH NAUGHT.

Signature: _____

Printed Name: _____

Title: _____

Nongovernmental entity: _____

Date: _____

STATE OF _____
COUNTY OF _____

SWORN TO AND SUBSCRIBED before me ___ in person or _____ remote notarization by _____ as _____ on behalf of _____, who is personally known to me or who produced _____ as identification this _____ day of _____, 20___.

_____
Notary Public (Notary Seal)

RESPONSE DOCUMENT #16:

INVITATION TO BID (ITB) & RESPONDENT'S ACKNOWLEDGEMENT

ITB TITLE:
Okaloosa County New Tax Collector's Office/County Government Services Building

ITB NUMBER:
ITB PW 26-25

ISSUE DATE:	_____	
LAST DAY FOR QUESTIONS:	_____	@ 3:00 P.M.
ITB OPENING DATE & TIME:	_____	@ 3:00 P.M.

NOTE: BIDS RECEIVED AFTER THE BID OPENING DATE & TIME WILL NOT BE CONSIDERED.

Okaloosa County, Florida solicits your company to submit a bid on the above referenced goods or services. All terms, specifications and conditions set forth in this ITB are incorporated into your response. A bid will not be accepted unless all conditions have been met. All bids must have an authorized signature in the space provided below. All bids must be submitted electronically by the time and date listed above. Bids may not be withdrawn for a period of ninety (90) days after the bid opening unless otherwise specified.

RESPONDENT ACKNOWLEDGEMENT FORM BELOW MUST BE COMPLETED, SIGNED, AND RETURNED AS PART OF YOUR BID. BIDS WILL NOT BE ACCEPTED WITHOUT THIS FORM, SIGNED BY AN AUTHORIZED AGENT OF THE RESPONDENT.

COMPANY NAME _____

MAILING ADDRESS _____

_____

CITY, STATE, ZIP _____

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER (FEIN): _____

TELEPHONE NUMBER _____ EXT: _____

FAX: _____ EMAIL: _____

I CERTIFY THAT THIS BID IS MADE WITHOUT PRIOR UNDERSTANDING, AGREEMENT, OR CONNECTION WITH ANY OTHER RESPONDENT SUBMITTING A BID FOR THE SAME MATERIALS, SUPPLIES, EQUIPMENT OR SERVICES, AND IS IN ALL RESPECTS FAIR AND WITHOUT COLLUSION OR FRAUD. I AGREE TO ABIDE BY ALL TERMS AND CONDITIONS OF THIS BID AND CERTIFY THAT I AM AUTHORIZED TO SIGN THIS BID FOR THE RESPONDENT.

AUTHORIZED SIGNATURE: _____ PRINTED NAME: _____

TITLE: _____ DATE: _____

RESPONDENT'S ACKNOWLEDGEMENT

END OF DOCUMENT 00 41 23

DOCUMENT 00 43 21 - ALLOWANCE FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 01 21 00 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, _____.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 00 43 21

DOCUMENT 00 43 22 - UNIT PRICES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.

C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES

A. Unit-Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.

1. _____ dollars ($_____) per unit.

B. Unit-Price No. 4: Miscellaneous and structural steel.

1. _____ dollars ($_____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, _____.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 00 43 22

DOCUMENT 00 43 23 - ALTERNATES FORM

1.1 BID INFORMATION

A. Prime Contract: _____.
(Print or Type Name of Entity)

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. 01: SITEWORK

1. Description:
   All exterior sitework 3'-0" beyond the building perimeter excluding the other additive alternatives per civil drawings.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

B. Alternate No. 02: EAST PARKING LOT

1. Description:
   a. Repave the shared east parking lot and provide new striping.
   b. Add code compliant additional handicap parking spaces for Civic Center.
   c. Add landscaping islands and irrigation systems.
   d. Relocate light fixture poles.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

C. Alternate No. 03: NEW COURTYARD

1. Description: .
   a. Provide sidewalks, seat walls, and landscaping.
   b. Provide Trellis Shade Structures.
   c. Provide Site Drainage.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

D. Alternate No. 04: NEW CAMPUS SIGN @ HIGHWAY 85

1. Description: Per Title.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

E. Alternate No. 05: STONE WAINSCOT FOR HALLWAYS 101 & 102, & 401, 402:

1. Description:
   a. Add Exterior Stone Cladding & Cast Stone for Wainscoting.
   b. Base bid will be rubber base and rubber chair rail.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

F. Alternate No. 06: HARD CEILINGS FOR HALLWAYS 101 & 102, & 401, 402:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and can light fixtures.
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

G. Alternate No. 07: HARD CEILINGS FOR HALLWAYS 152,153,154:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and 2x2 light fixtures.
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

H. Alternate No. 08: HARD CEILINGS FOR HALLWAYS 231,232:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and 2x2 light fixtures.
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

I. Alternate No. 09: WOOD CEILINGS FOR BREAKROOMS 118 & 206:

1. Description:
   a. Provide wood panel ceiling system.
   b. Provide linear LED lighting.
   c. Base bid will be acoustical ceiling tile and 2x4 light fixtures
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

J. Alternate No. 10: TAX COLLECTOR LOBBY 103 CEILING:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide down lights inside wood slat ceiling system.
   c. Base bid will be acoustical ceiling tile and can light fixtures.
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

K. Alternate No. 11: PROPERTY APPRAISER LOBBY 201 CEILING:

1. Description:
   a. Provide wood panel ceiling system for PA Lobby 201 Ceiling.
   b. Provide Gypsum board ceilings for Clerks 217.
   c. Provide linear LED lighting for PA Lobby 201.
   d. Provide can lights for Clerks 217.
   e. Base bid will be acoustical ceiling tile and can light fixtures for PA Lobby 201 & Clerks 217 ceilings.
   f. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

L. Alternate No. 12: TRAINING 406 CEILING:

1. Description:
   a. Provide Gypsum board ceilings with wood panel ceiling system.
   b. Provide linear LED lighting.
   c. Base bid will be acoustical ceiling tile in lieu of wood panels and 2x4 light fixtures.
   d. See Mechanical & Electrical for further coordination.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

M. Alternate No. 13: WOOD DOOR SURROUNDS FOR HALLWAYS 101 & 102, & 401, 402:

1. Description:
   a. Provide Wood Door Surround raised panel design.
   b. Base bid will be no surround.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

N. Alternate No. 14: WOOD DOOR SURROUNDS FOR HALLWAYS 152,153,154, 231, 232:

1. Description:
   a. Provide Wood Door Surround raised panel design.
   b. Base bid will be no surround.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

O. Alternate No. 15: EMERGENCY GENERATOR:

1. Description:
   a. Provide emergency generator for facility.
   b. Base bid will be no generator.
   c. Base bid will have a connection transfer switch for temporary generator connection.

2. ADD ____ DEDUCT ____ NO CHANGE ____ NOT APPLICABLE ____.
3. _____ Dollars ($ _____).
4. ADD ____ DEDUCT ____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, _____.

B. Submitted By: _____
(Print or Type Name of Entity)

C. Authorized Signature : _____
(Handwritten Signature)

D. Signed By: _____
(Type or Print Name)

E. Title: _____
(Owner/Partner/President/Vice President)

END OF DOCUMENT 00 43 23

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DOCUMENT 00 43 36 - PROPOSED SUBCONTRACTORS FORM

1.1 BID INFORMATION

A. Bidder: _____.
(Print or Type Name of Bidding Entity)

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 LIST OF SUBCONTRACTORS

A. List of subcontractors for Project consist of the following:

1. List to be submitted in duplicate with the bidders 00 41 13 Bid Form in a separate envelope in accordance with the instructions to bidders.

2. The undersigned, hereafter called "Bidder", lists below the names of the subcontractors who will perform the phases of the work indicated:

Division:	Print or Type Company Name of Subcontractor
Sitework:	_____
Landscape:	_____
Paving:	_____
Utilities:	_____
Cast in Place Concrete:	_____

Masonry: _____

Metal Trusses: _____

Structural Steel: _____

Carpentry: _____

Casework: _____

Metal Roofing: _____

Membrane Roofing: _____

Joint Sealants: _____

Doors: _____

Storefronts: _____

Drywall: _____

Flooring: _____

Painting: _____

Elevator: _____

Fire Protection: _____

Plumbing: _____

Mechanical: _____

Electrical: _____

Access Control: _____

Telecommunications: _____

Note: A total listing of subcontractors and suppliers is required to be executed within 72 hours of Bid Opening by apparent low bidder or if requested by Owner. If, due to alternate bids, more than one subcontractor or supplier must be considered, Contractor shall list each and state which is to be considered for base bid work and which is to be considered if a specific alternate is to be accepted.

The undersigned declares that he/she has fully investigated each subcontractor listed and has determined to his/her own complete satisfaction that such subcontractor maintains a fully equipped organization, capable, technically and financially, of performing the pertinent work, and that he/she has made similar installation in a satisfactory manner.

SUBMISSION OF LIST OF SUBCONTRACTORS

B. Respectfully submitted this ____ day of _____, _____.

C. Submitted By: _____
(Print or Type Name of Bidding Entity)

D. Authorized Signature : _____
(Handwritten Signature of Bidder)

E. Signed By: _____
(Type or Print Name of Bidder)

F. Title: _____
(Owner/Partner/President/Vice President)

PLEASE SIGN AND RETURN WITH BID

END OF DOCUMENT 00 43 36

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DOCUMENT 00 43 73 - PROPOSED SCHEDULE OF VALUES FORM

1.1 BID FORM SUPPLEMENT

A. A completed Proposed Schedule of Values form is required no later than 7 calendar days after Bid.

1.2 PROPOSED SCHEDULE OF VALUES FORM

A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual table of contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.

B. Arrange schedule of values consistent with format of The American Institute of Architect's (AIA) Document G703-1992 "*Application and Certificate for Payment and Continuation Sheet*".

1. Copies of AIA standard forms may be obtained from the American Institute of Architects: http://www.aiacontracts.org/; email: docspurchases@aia.org; phone: (800) 942-7732.

END OF DOCUMENT 00 43 73

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DOCUMENT 00 43 93 - BID SUBMITTAL CHECKLIST

1.1 BID INFORMATION

A. Bidder: _____
(Print or Type Name of Bidding Entity)

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 BIDDER'S CHECKLIST

A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.

B. Attach this completed checklist to the outside of the Submittal envelope.

1. Used the Bid Form provided in the Project Manual.
2. Prepared the Bid Form & its Attachments as required by the Instructions to Bidders.
3. Indicated on the Bid Form the Addenda received.
4. Attached to the Bid Form: Alternates Form.
5. Attached to the Bid Form: List of Subcontractors.
6. Attached to the Bid Form: Proposed Schedule of Values Form.
7. Attached to the bid Form: Bid Bond.
8. Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.
9. Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

SIGN AND RETURN WITH BID:

Signed:_____

END OF DOCUMENT 00 43 93

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DOCUMENT 00 51 00 - NOTICE OF AWARD

1.1 NOTICE OF AWARD

A. Bidder: _____
(Print or Type Name of Bidding Entity)

B. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

C. Project Location: 1448 Commerce Drive
Crestview, FL 32539

D. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

E. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

F. Architect Project Number: 24044

1.2 NOTICE OF AWARD OF CONTRACT

A. Notice: The above Bidder is hereby notified that their bid, dated _____, for the above Contract has been considered and the Bidder is hereby awarded a contract for above project.

B. Contract Sum: The Contract Sum is

1. _____

_____ Dollars ($_____)

1.3 EXECUTION OF CONTRACT

A. Contract Documents: Copies of the Contract Documents will be made available to the Bidder immediately. The Bidder must comply with the following conditions precedent within **10** days of the above date of issuance of the Notice:

1. Deliver to Owner **three** sets of fully executed copies of the Contract Documents.
2. Deliver with the executed Contract Documents Bonds and Certificates of Insurance required by the Contract Documents.

B. Compliance: Failure to comply with conditions of this Notice within the time specified will entitle Owner to consider the Bidder in default, annul this Notice, and declare the Bidder's Bid security forfeited.

1. Within **10** days after the Bidder complies with the conditions of this Notice, Owner will return to the Bidder one fully executed copy of the Contract Documents.

1.4 NOTIFICATION

A. This Notice is issued by:

1. Respectfully issued this _____ day of _____, _____.

2. Owner: _____
(Print or Type Name of Owner)

3. Authorized Signature: _____
(Handwritten Signature of Owner)

4. Signed By: _____
(Type or Print Name of Owner)

5. Title: _____
(Owner/Partner/President/Vice President)

END OF DOCUMENT 00 51 00

DOCUMENT 00 52 00 - AGREEMENT FORMS

1.1 AGREEMENT FORMS

A. The following form of Owner/Contractor Agreement shall be used for this Project:

1. The American Institute of Architects (AIA) Document A101-2017 "*Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum,*".
2. Copies of AIA standard forms may be obtained from the American Institute of Architects: http://www.aiacontracts.org/; email: docspurchases@aia.org; phone: (800) 942-7732.

B. A Draft Copy is attached.

END OF DOCUMENT 00 52 00

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DRAFT

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

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

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

« »« »
« »
« »
« »

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

« »« »
« »
« »
« »

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

«»
«»
«»

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

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

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

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

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

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TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

[« »] The date of this Agreement.

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

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

« »

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

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

§ 3.3 Substantial Completion

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

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

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

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

Item	Units and Limitations	Price per Unit ($0.00)

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

« »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

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

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

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

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

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

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

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

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

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

« »

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

« »

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

« »

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

« »

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

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

§ 5.2 Final Payment

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

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

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

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

« »

§ 5.3 Interest

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

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

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

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

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

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

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

« »

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

« »
« »
« »
« »
« »
« »

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

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

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

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

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

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

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

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

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

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

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

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

« »

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

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

SECTION 00 60 00 - PROJECT FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:

1. AIA Document A102-2017 "Standard Form of Agreement between Owner and Contractor Where the Basis of Payment is a Stipulated Sum."

a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."

2. The General Conditions are included in the Project Manual.
3. The Supplementary Conditions for Project are incorporated into a modified copy of the General Conditions included in the Project Manual.

1.2 ADMINISTRATIVE FORMS

A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.

B. Copies of AIA standard forms may be obtained from the American Institute of Architects; www.aiacontractdocsaiacontracts.org; (800) 942-7732.

C. Preconstruction Forms:

1. Form of Bid Bond: AIA Document A310-2010 "Bid Bond."
2. Form of Performance Bond and Labor and Material Bond: AIA Document A312-2010 "Performance Bond and Payment Bond."
3. Form of Certificate of Insurance: AIA Document G715-2017 "Supplemental Attachment for ACORD Certificate of Insurance 25."

D. Information and Modification Forms:

1. Form for Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
2. Form of Request for Proposal: AIA Document G709-2018 "Proposal Request."
3. Change Order Form: AIA Document G701-2017 "Change Order."
4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-2017 "Architect's Supplemental Instructions."
5. Form of Change Directive: AIA Document G714-2017 "Construction Change Directive."

E. Payment Forms:

1. Schedule of Values Form: AIA Document G703-1992 "Continuation Sheet."
2. Payment Application: AIA Document G702-1992/703-1992 "Application and Certificate for Payment and Continuation Sheet."

3. Form of Contractor's Affidavit: AIA Document G706-1994 "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A-1994 "Contractor's Affidavit of Payment of Release of Liens."
5. Form of Consent of Surety: AIA Document G707-1994 "Consent of Surety to Final Payment."

END OF SECTION 00 60 00

DOCUMENT 00 61 13 – BID BOND, PERFORMANCE BOND AND PAYMENT BOND

1.1 BONDS

A. The following form of Bid Bond shall be used for this Project:

1. The American Institute of Architects (AIA) Document A310-2010 "*Bid Bond*"
2. Copies of AIA standard forms may be obtained from: The American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732.
3. Unless otherwise specified or instructed, all bonds shall be paid for by contractor and made payable to the Owner.

B. The following form of Performance Bond and Payment Bond shall be used for this Project:

1. The American Institute of Architects (AIA) Document A312-2010 "*Performance Bond and Payment Bond*"
2. Copies of AIA standard forms may be obtained from: The American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732.
3. Bonds shall be equal to one hundred percent (100%) of Contract price and shall be required, plus any alternates.

END OF DOCUMENT 00 61 13

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SECTION 00 65 00 – OWNER DIRECT PURCHASE PROCEDURES

PART 1 – ODP PROGRAM AND PROCEDURES

1.1 GENERAL

A. This project will include Owner Direct Purchases (ODP) to take advantage of the Okaloosa County's tax-free status and these purchases shall be scheduled, coordinated, and accommodated by the Contractor on behalf of the County.

1. Pursuant to Florida Statutes, Section 212.08(6), and Florida Administrative Code, Rule 12A-1.094, Okaloosa County is exempt from Florida Sales Tax for the purchase of construction materials, supplies and/or equipment incorporated into a construction project.
2. The County has elected to exercise this right to direct purchase selected materials on this project and such direct purchase shall be without any additional cost to the County. All bids are to be submitted with all applicable taxes included.
3. The Contractor shall follow the District's Owner Direct Purchase procedures in accordance with the attached guidelines and Fire District Board policy in this section. See the "Owner Direct Purchase Program Guidelines" for complete details and information herein.
4. The Contractor shall assume all risk and remain fully responsible for all material incorporated into the project, directly purchased by the Owner or not. This will include, but not be limited to, insurance, theft, storage, damage during installation, coordination, quantities ordered, submittals, protection, scheduling, shipping, security, expediting, receiving, installation, cleaning, and all applicable warranties.

END OF SECTION 00 65 00

Owner Direct Purchase Program Guidelines

As a cost savings measure the Okaloosa County (County), a tax-exempt entity of the State of Florida, will implement an owner direct material purchase program.

I. The County's established procedures are as follows:

A. The County will establish owner direct material purchase projects and budgets through the established budgeting process. The owner direct material purchase program will be utilized for major construction and remodeling and/or renovation projects which have construction cost estimates in excess of $50,000.

B. The County will advertise, accept, open and select bids through the established process.

C. The selected contractor must agree to adhere to the County's owner direct material purchase procedures. Likewise, it will be the selected contractor's responsibility to ensure that any and all subcontractors abide by said direct material purchase procedures.

1. Upon agreement, contract will be awarded, and purchase order issued in accordance with established procedures.
2. If not agreed, the District will contact the second ranked contractor.

II. After the contract has been awarded, the procedures for owner direct material purchases (ODP) will be as follows:

A. Direct Material Purchase List

1. The contractor will identify and prepare a list of materials (utilizing $5,000 threshold minimum per vendor) for ODP by the County. The contractor will forward the list to the architect. The list of materials and pricing should contain the following categories:
    a. Acoustical
    b. Block
    d. Concrete
    e. Electrical
    f. Glass & Glazing
    g. Hollow Metal
    h. Mechanical
    i. Millwork
    j. Plumbing
    k. Roofing
    i. Specialties
    m. Steel
    n. Doors & Windows

2. The architect will review the list.
    a. Upon approval, the architect will forward the list to County.
    b. If not approved, the architect will return the list to the contractor for modification and resubmission.

3. The County will notify the contractor of approval.

B. Change Order Process
1. The contractor will request a change order through the process as identified in the contract documents. Items relating to the Direct Purchasing List will be identified by the Contractor and forwarded to the Architect for review and approval.
2. Architect will review request for change notice.
    a. Upon approval, architect will forward request for change order to The District.
    b. If not approved, architect will return request for change order to contractor for modification and resubmission.
3. The County will review the change order for approval.

C. ODP Purchase Order Process
1. Contractor will prepare a purchase requisition based on the list of materials eligible for ODP (utilizing $5,000 threshold) as previously approved by the Architect and the County. A separate purchase requisition must be submitted for each supplier to a contractor or subcontractor. The purchase requisition must contain the following information and include a breakdown of the amount of sales tax associated with each item.
    a. Description of Item
    b. Quantity of Item
    c. Unit Cost
    d. Vendor Name
    e. Vendor Address
    f. Vendors Tax Identification Number
    g. Ship to Address
    h. Remittance Address
    i. Specified terms of payment
    j. Invoice to Information.
2. Contractor will forward ODP purchase requisition to the Architect for review and approval.
3. The County will review the purchase requisition for approval.

D. Once approved, the contractor may make the purchase and coordinate with the delivery of the materials.

E. Material Delivery, Receiving & Payment Process
1. Supplier will deliver ODP materials to the job site or other designated temporary location.

2. Contractor and/or subcontractor will receive materials.
    a. Upon approval, materials will be left at job site or other designated temporary location and contractor and/or subcontractor will assume custodial responsibility for materials.
    b. If not approved, supplier will modify material delivery and resubmit to contractor.

3. Vendor will submit invoices to contractor and/or subcontractor. The invoices must reference the P.O. number and billed as follows:
    Okaloosa County
    c/o General Contractor or Subcontractor

4. Contractor will review vendor invoices and match receiving reports to invoices. Pay requests shall be submitted on a two week basis except in instances where payment discounts are involved.
    a. Upon approval, contractor will forward original receiving reports and invoices to the architect.
    b. If not approved, contractor will return invoices to vendor for modification and resubmission.

5. Architect will review invoices and receiving reports.
    a. Upon approval, architect will forward original invoices to The County.
    b. If not approved, architect will return invoices to contractor for modification and resubmission.

6. The District will review receiving reports and invoices.
    a. Upon approval, The County will disburse the appropriate payment
    b. If not approved, The County will return invoices to contractor for modification and resubmission.

F. ODP Purchase Order Closeout Process

1. General Contractor submits to The County a final accounting of ODP purchases prior to substantial completion of project.

2. The County will verify the final accounting report.
    a. If not approved, The County will return final accounting report to contractor for modification and resubmission.

DOCUMENT 00 65 20 - AFFIDAVIT OF PAYMENT AND RELEASE OF LIEN

1.1 AFFIDAVIT OF PAYMENT AND RELEASE OF LIEN

A. The following form of Affidavits shall be used for this Project:

1. Contractor shall submit the American Institute of Architects' (AIA) Document G706-1994, "*Contractor's Affidavit of Payment of Debts and Claims*" and AIA Document G706A-1994, "*Contractor's Affidavit of Release of Liens*", along with supporting documents listed within each document, with each Application for Payment. Contractor shall attach separate Releases or Waivers of Lien from each Contractor, Subcontractor and supplier of material and equipment represented in each Application for Payment.
2. Copies of AIA standard forms may be obtained from the American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732.

END OF DOCUMENT 00 65 20

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DOCUMENT 00 65 36 - CONTRACTOR WARRANTY FORM

A. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

B. Project Location: 1448 Commerce Drive
Crestview, FL 32539

C. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

We, _____, General Contractor for
(Print or Type Name of Company or Corporation)

the above-referenced project, do hereby warrant that all labor and materials furnished and work performed are in accord with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of **1**(**One) Year** from **Date of Substantial Completion.**

This warranty commences on: _____
(Date of Substantial Completion affixed by Architect)

and expires on: _____
(Expiration Date)

Should defects develop during the warranty period due to improper materials, workmanship or arrangement, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner.

The Owner will give Contractor written notice of defective work. Should Contractor fail to correct defective work within **60** days after receiving written notice, the Owner may, at his option, correct defects and charge Contractor costs for such correction. Contractor agrees to pay such charges upon demand.

Nothing in the above shall be deemed to apply to work which has been abused or neglected by the Owner.

Submitted By: _____
(Print or Type Name of Entity)

Authorized Signature: _____
(Handwritten Signature)

Signed By: _____
(Type or Print Name)

Title: _____ Date: _____
(Owner/Partner/President/Vice President)

END OF DOCUMENT 00 65 36

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SECTION 00 65 37 - INSTALLER WARRANTY FORM

A. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

B. Project Location: 1448 Commerce Drive
Crestview, FL 32539

C. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

We, _____, Installer
(Print or Type Name of Subcontractor Company or Corporation)

for _____, as described
(List Trade)

in Specification Section(s) _____.
(List appropriate sections of Specifications)

do hereby warrant that all labor and materials furnished and work performed in conjunction with the above-referenced project are in accord with the Contract Documents and authorized modifications thereto, and will be free from defects due to defective materials or workmanship for a period of _____ year(s) from Date of Substantial Completion.

This warranty commences on: _____
(Date of Substantial Completion affixed by Architect)

and expires on: _____
(Expiration Date)

Should defects develop during the warranty period due to improper materials, workmanship or arrangement, the same, including adjacent work displaced, shall be made good by the undersigned at no expense to the Owner.

The Owner will give Installer written notice of defective work. Should Installer fail to correct defective work within **60** days after receiving written notice, the Owner may, at his option, correct defects and charge Installer costs for such correction. Installer agrees to pay such charges upon demand.

Nothing in the above shall be deemed to apply to work which has been abused or neglected by the Owner.

Submitted By: _____ _____
(GC Company Name) *(Installer's Company Name)*

Signature: _____ _____
(Handwritten Signature) *(Handwritten Signature)*

Signed By: _____ _____
(Type or Print Name) *(Type or Print Name)*

Date: _____ _____

END OF DOCUMENT 00 65 37

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SECTION 00 72 00 - GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

1.1 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. The following form of General Conditions shall be used for this Project:

1. The American Institute of Architects (AIA) Document A201-2017 "*General Conditions of the Contract for Construction*"
2. Copies of AIA standard forms may be obtained from the American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732.

B. The Contractor is hereby specifically directed, as a condition of the Contract, to obtain the necessary number of copies of AIA Document A201-2017, to acquaint himself with the Articles contained therein and to notify and appraise all Subcontractors, Suppliers and any other parties of the Contract or Individuals or Agencies engaged in the work as to its contents.

C. No contractual adjustments shall be due or become exigent as a result of, or failure on the part of the Contractor to fully acquaint himself and all other parties to the contract with the conditions of AIA Document A201-2017.

1.2 SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

A. Clarifications, modifications and additions to the Standard General Conditions are included in Section 00 73 00 "Supplementary General Conditions of the Specifications".

END OF DOCUMENT 00 72 00

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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

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

Okaloosa County Tax Collector (Architect's Project 24044)
1448 Commerce Drive Crestview, Fl 32539

THE OWNER:
(Name, legal status and address)

Okaloosa County
Board of County Commissioners
1250 N. Eglin Pkwy
Shalimar, Fl 32579

THE ARCHITECT:
(Name, legal status and address)

DAG Architects, Inc.
1223 Airport Rd. #104
Destin Fl, 32541

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

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

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

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Reserved

(Paragraphs deleted)

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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

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

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

and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

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

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be

increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any

Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

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

§ 6.2 Mutual Responsibility

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

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

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

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

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the

Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

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

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

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

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss.

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

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

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

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

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

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

§ 15.2 Initial Decision

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

and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation. 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.

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

(Paragraph deleted)

§ 15.4 Reserved

(Paragraphs deleted)

Additions and Deletions Report for
AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:40:13 CT on 02/27/2025.

PAGE 1

Okaloosa County Tax Collector (Architect's Project 24044)
1448 Commerce Drive Crestview, Fl 32539

...

Okaloosa County
Board of County Commissioners
1250 N. Eglin Pkwy
Shalimar, Fl 32579

...

(Name, legal status and address)

DAG Architects, Inc.
1223 Airport Rd. #104
Destin Fl, 32541

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

...

The parties [illegible]pon ~~written~~ protocols governing the transmission and use ~~of, and reliance on,~~ of Instruments of Service or [illegible]ormation or documentation in digital form. The parties will use AIA Document E203™–2013, Bu[illegible] Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

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Any use of, or reliance on, all or a portion of a building information model without agreement to ~~written~~ protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying

party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

...

§ 2.2 ~~Evidence of the Owner's Financial Arrangements~~Reserved

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

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

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

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

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

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.4 otherwise is guilty of ~~substantial~~ breach of a provision of the Contract Documents.

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

§ 15.3.3 ~~Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.~~The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

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

§ 15.4 ~~Arbitration~~Reserved

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

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

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

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

§ 15.4.4 ~~Consolidation or Joinder~~

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

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

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

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:40:13 CT on 02/27/2025 under Order No. 2114498038 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Title)

_____

(Dated)

SECTION 00 73 00 – SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION (AIA A201-2017)

PART 1 - STANDARD GENERAL CONDITIONS

1.1 STANDARD GENERAL CONDITIONS

A. The following form of General Conditions shall be used for this Project:

1. American Institute of Architect's (AIA) Document A201-2017, "*General Conditions of the Contract for Construction*", inclusive, is a part of this Contract, it is incorporated herein.
2. Copies of AIA standard forms may be obtained from the American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732.

B. The Contractor is hereby specifically directed, as a condition of the Contract, to acquaint themself with the Articles contained therein and to notify and appraise all Subcontractors, Suppliers and any other parties of the Contract or individuals or agencies engaged in the work as to its contents.

C. No contractual adjustments shall be due or become exigent as a result of, or failure on the part of the Contractor to fully acquaint themself and all other parties to the contract with the conditions of AIA Document A201-2017

PART 2 - SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from or add to the AIA Document A201-2017, "*General Conditions of the Contract for Construction*". Where a portion of the General Conditions of the Contract for Construction is modified or deleted by these Supplementary General Conditions of the Contract for Construction, unaltered portions of the General Conditions of the Contract for Construction shall remain in effect. 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.

2.1 ARTICLE 1: GENERAL PROVISIONS

A. 1.1 Basic Definitions

1. Add the following § 1.1.5.1 to § 1.1.5:

§ 1.1.5.1 The word "Drawings" refers to and indicates all drawings or reproductions of drawings pertaining to construction of work contemplated, and its appurtenances.

2. Add the following § 1.1.6.1 to § 1.1.6:

§ 1.1.6.1 The word “Specifications” refers and indicates descriptions, provisions, and requirements contained herein together with all written agreements made or to be made, pertaining to method and manner of performing work, or to quantities and qualities of materials to be furnished under the Contract.

B. **1.2 Correlation and Intent of the Contract Documents**

1. Add the following § 1.2.1.2 to § 1.2.1:

§ 1.2.1.2 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

1. The Agreement.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.
5. Drawings and Specifications.

In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect’s interpretation.

C. **1.6 Notice.**

1. Add a new Section 1.6.3 as follows:

Notice may be given by email or other electronic means for which there is proof of delivery. Recipient must acknowledge receipt.

2.2 ARTICLE 2: OWNER

A. 2.1 General

1. Delete Paragraph 2.1.2.

B. 2.2 Evidence of the Owner’s Financial Arrangements.

1. Section **§2.2.2**: Replace Section 2.2.2 in its entirety with the following:

§2.2.2 At the Contractor’s written request, the Owner shall furnish the Contractor written evidence that adequate financial arrangements, satisfactory to the Contractor, have been made to fulfill the Owner’s obligations under the Contract, including specifically the certain and ready availability of funds to pay the Contractor the Contract Sum, as may be adjusted. The furnishing of such evidence shall be a condition precedent to the Contractor’s commencement or continuation of the Work. If the Owner fails to provide such evidence within ten days of the Contractor’s request, the Contractor may immediately stop the Work and so notify the Owner. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended and the Contract Sum shall be increased by the

amount of the Contractor's costs of shutdown, delay, and start-up attributable to such Work stoppage and resumption.

C. 2.3 Information and Services Required of the Owner

1. Section 2.3.1. Amend Section 2.3.1 by replacing it with the following:

   §2.3.1 Unless provided specifically to the contrary, the Owner shall be responsible for obtaining and paying for all permits, licenses, fees, and charges, excepting only the Contractor's license and building permit. By way of example and not limitation, the Owner shall secure and pay separately and outside the Contract Sum for all necessary approvals, assessments, permits, licenses, fees, charges, and costs related to the real property, including title, easements, and zoning; use or occupancy requirements for permanent structures, including compliance with applicable codes and for permanent changes in existing facilities; permits and authorizations for effluent, air pollution, water pollution, or other environmental impacts; removal and disposal of hazardous, toxic, contaminated, or harmful substances, impact or other fees, including, as an example, those related to the effect of completed construction on utilities; and satisfying requirements of governmental authorities.

2. Delete § 2.3.6 and substitute the following:

   § 2.3.6 The Contractor will be furnished Construction Documents (Drawings and Project Manuals) in PDF format for reproduction as required for construction of this project. All copies are the responsibility of the contractor.

D. 2.6 Extent of Owner's Rights

1. Add the following Section "**§2.6 Extent of Owner's Rights**" with the following:

   § 2.5.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) at law, or (iii) in equity.

   § 2.5.2 In no event shall the Owner and the Architect have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work.

   § 2.5.3 The Contractor's obligation to correct defective Work and responsibility for damage resulting or arising therefrom shall survive completion of this Agreement in accordance with Section 3.5.

2.3 ARTICLE 3: CONTRACTOR

A. § 3.1 General

1. Add the following paragraph to the end of § 3.1.:

§ 3.1.4 No contractual adjustments shall be due or become exigent as a result of, or failure on the part of the Contractor to fully acquaint himself and all other parties to the Contract with the General Conditions and Supplementary General Conditions.

B. § 3.2 Review of Contract Documents and Field Conditions by Contractor

1. Add the following **§ 3.2.2.1** to the end of § 3.2.2:

§ 3.2.2.1 Prior to commencing any excavation or grading, the Contractor shall satisfy himself as to the accuracy of all survey data as indicated in these Drawings and Specifications and/or as provided by Owner. Should the Contactor discover any inaccuracies, errors, or omissions in the survey data, the Contractor shall immediately notify the Architect in order that proper adjustments can be anticipated and ordered. Commencement by the contractor of any excavation or grading shall be held as an acceptance of the survey data by the Contractor, after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said survey data.

2. Add the following § 3.2.5, §3.2.6, § 3.2.7, §3.2.8 to § 3.2:

§ 3.2.5 If, in Contractor's opinion, any work is indicated on Drawings, or is specified in such as manner as will make it impossible to produce a generally acceptable piece of work, or should discrepancies appear between drawings and specifications, he shall refer it to Architect for decision before proceeding with Work.

§ 3.2.6 If Contractor fails to make such reference, no excuse will thereafter be entertained for failure to carry our work in satisfactory manner. Should a conflict occur in or between Drawings or Specifications, Contractor shall be deemed to have estimated on a more expensive way of doing work unless he shall have asked for and obtained a decision, in writing, from Architect before submission of proposal as to which method or materials will be required.

§ 3.2.7 Figures govern scale dimensions and large scale drawings govern those of smaller scale. If drawings and specifications conflict or require any clarification that was **not obtained prior to bidding**, the Contractor shall estimate and **include in his bid the more expensive method or material**. No deviation shall be made from plans and specifications except upon written order of the Architect.

§ 3.2.8 Contractor shall, within **fifteen (15) days** after signing of Contract, file with the Architect, a correct, complete itemized schedule of materials and subdivisions of work, giving quantities and unit prices of complete labor and materials.

C. 3.3 Supervision and Construction Procedure

1. Add the following §§ 3.3.5, and 3.368 to § 3.3:

§ 3.3.5 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the

Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

§ 3.3.6 Contractor shall be responsible for notifying and requesting the local Authority Having Jurisdiction Inspector of the Contractor's need for inspections to meet the Florida Building Code. The Contractor shall obtain from the local Building Code Official the list of systems and materials required to be inspected for occupancy.

1. The Contractor shall be responsible for Building Code Inspection costs beyond the initial Building Permit Costs that are paid by the Owner.
2. The Contractor shall be responsible for any additional Building Code Inspection costs accrued due to failure to pass the initial inspection.

D. 3.4 Labor and Materials

1. Add the following §§ 3.4.4, 3.4.5, 3.4.6 and 3.4.7 to § 3.4:

§ 3.4.4 BEFORE bids are due and transmitted to the Owner, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications), Section "SUBSTITUTION PROCEDURES.".

§ 3.4.5 By making requests for substitutions based on § 3.4.4 above, the Contractor:

1. Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
2. Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
3. Certifies that the cost data presented is complete and includes all related costs under this Contract, including the Architect's or Engineer's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.6 The Contractor shall follow all specified and manufacturer's standards for Delivery, Storage and Handling of all products. All products that require storage in a climate-controlled environment shall be so handled. In all cases the more stringent guidelines shall be followed.

§ 3.4.7 The Contractor shall follow all specified and manufacturer's instructions and conditions for installation of all products and finishes.

E. 3.5 Warranty

1. Add the following §§ 3.5.3, 3.5.4, 3.5.5, 3.5.6 to § 3.5:

§ 3.5.3 The warranty provided in this paragraph shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents.

§ 3.5.4 The Contractor shall provide the Owner with written warranties covering the work for the periods of time specified in the Contract Documents. As a minimum the work will be guaranteed against defects in materials and workmanship for **one (1) year** from the date of Final Completion of the project by the Owner. The date of Final Completion shall be the beginning date of all warranties (see Article 8).

§ 3.5.5 The Contractor agrees to assign to the Owner, or any of its assigns, at the time of final completion of the Work, any and all manufacturer's or subcontractor's warranties relating to materials and labor used in the Work, and further agrees to perform the Work in such manner as to preserve any and all such manufacturer's warranties.

§ 3.5.6 The Contractor and its Subcontractors shall ensure that all warranties are freely assignable by the Owner or any subsequent owner of the property.

F. 3.6 Taxes

1. Add the following §§ 3.6.1, 3.6.2, 3.6.3, 3.6.4, 3.6.5, 3.6.6 to § 3.6:

§ 3.6.1 Although the Owner is not subject to the Florida Sales and Use Tax, any Contractor who purchases materials which will be used in the construction of a public-owned building or tax exempt institution will not be exempt from the sales tax on these materials as evidences by the following excerpt from the Florida Statutes:

a. The State, any county, municipality or political subdivision of this state is exempt from the sales tax, except this exemption shall not include sales or tangible personal property made to Contractors employed either directly or as agents of such government or political subdivision thereof when such tangible personal property going into or becomes a part of public works owned by such government or political subdivision thereof.

§ 3.6.2 If the owner exercised his right to purchase directly various construction building material, supplies and equipment that may be a part of this contract, the contractor will then assist in the coordination of direct purchasing for the owner. The owner will via his purchase order, directly purchase the materials and the contractor and/or each subcontractor shall assist the owner and contractor in the preparation of purchase orders.

§ 3.6.3 The contract amount shall be reduced by the net, undiscounted amount of the purchase orders, plus all sales taxes. Issuance of the purchase orders by the owner shall not relieve the contractor/subcontractor of any of his responsibilities regarding specifications for material purchases. The contractor shall remain fully responsible for timing coordination, correct quantities ordered, submittals, and schedule expediting. After issuing an installation notice to the owner, the

contractor shall be responsible for the receipt of materials from the owner in suitable condition and the protection of those materials during construction unit substantial completion of the project.

§ 3.6.4 General Description:

1. Summary: In connection with this construction project, the owner reserves the option to enter into an agreement with the contractor to purchase all, or a portion of the tangible personal property necessary for the performance of the contract, and thereby to save the amount of the sales tax thereon by virtue of the status as a tax exempt institution.

2. Base Bid: The base bid (and all alternate bids) submitted on the bid form **WILL INCLUDE THE COST OF ALL REQUIRED TAXES, including sales and use tax.**

3. Bids: The contractor shall submit his bid and bids for each alternate with the inclusion of all required taxes including sales and use tax, the same as if tax were to be paid in the normal manner. The sales and use tax savings will be affected during the performance of the construction contract.

4. Administrative Costs: Any and all administrative costs incurred by the contractor assisting the owner in administering the purchase in the name of the owner shall be considered to be included in the base bid for the work. No addition shall be added to the contract amount because of the service provided by contractor in the purchase of property, materials, etc., in the name of the owner.

5. Administration: The administration of the sales and use tax savings will be in accordance with the tax agreement and forms bound herein and the procedure will be administered through the contractor by the Owner's Administrator. Under the agreement, the contractor will be responsible to sign and submit to the owner duly authorized purchase order requisitions from which the owner may purchase necessary building construction materials for this project.

   The contract will be reduced by the sum of all direct material purchase orders "including" sales and use taxes. The owner will prepare all direct purchase orders as outlined in the enclosed instructions.

   The arrangements for such purchases in the name of the owner shall be made upon request by the contractor submitting said requisition and shall be under a procedure generally as described herein.

6. Responsibility: The contractor shall assist the owner by specifying, describing, submitting samples, preparing shop drawings, and preparing requisitions for materials to be purchased under this special purchase arrangement. The contractor shall also assist the owner by participating in the inspection of materials received by the owner and verifying/acknowledging the materials match what was specified/ordered. The owner shall accept only satisfactory

undamaged materials and equipment matching what was specified/ordered as verified/acknowledged by the contractor. The owner shall retain responsibility for the materials until issued and installation notice by the contractor. The owner shall retain responsibility for the materials until issued an installation notice by the contractor. After the issuance of an installation notice by the contractor any materials that are damaged or deemed unsatisfactory by the owner or owner's architect/engineer of record shall be replaced at no expense to the owner. No project delays will be accepted as a result of this arrangement.

§ 3.6.5 Provisions:

1. A Purchase Order Requisition, a form acceptable to the owner and contractor, shall be prepared by the contractor/subcontractor (s) and submitted to the owner prior to ordering owner purchased materials. The requisition form will provide; the name, FEIN (Federal Identification Number), address telephone number, and contract person for the materials supplier; a list of required items; the quantity needed; the price and sales tax associated with the materials; and delivery dates established by the contractor/subcontractor.

2. The owner will prepare and issue standard purchase order forms to the vendors through the general contractor.

3. In conjunction with the execution of purchase orders to the suppliers, the subcontractor shall execute and deliver to the contractor, deductive change orders reflecting the full value of all materials directly purchased by the owner, plus all sales tax savings associated with the materials. The contractor shall execute and deliver to the owner through the architect, all deductive change orders reflecting the full value of all materials directly purchased by the owner, plus all sales tax savings associated with the materials.

4. Title to owner purchased materials will vest in the owner at the time the materials are delivered to the owner owned construction site (F.O.B. job site).

5. The owner is billed through the contractor by the selling vendor for purchases of building materials.

6. The owner will make payment for the building materials directly to the selling vendor once the contractor verifies that the complete purchase order has been delivered on site, confirms that the materials are in good condition, and states that the material is properly stored/protected on site.

7. The owner will assume all risk of damage or loss for the tangible personal property/building materials from the time of purchase and prior to the issuance of an installation notice in order for the sale of building materials to be deemed (by the Florida Department of Revenue) a sale to the tax exempt entity and thus tax exempt. The owner will bear the costs of all Payment and performance Bonds and Owner Insurance including Builder's Risk Insurance for

materials purchased under direct tax saving purchase orders until release by the issuance of an installation notice.

8. The contractor will provide the building materials' vendor (with the owner's PO) a copy of the owner's current state of Florida sales tax exemption certificate.

9. This tax exemption does not apply to equipment rentals of contractor or subcontractors that provide construction services for the project, even though the economic burden of the tax, by contract or otherwise, may ultimately be borne by the owner.

§ 3.6.6 Requirements to issue Purchase Order.

1. The requirements for the following documentation be completed and in the office before ANY Direct Tax Saving Purchase Order(s) can be issued.

   a. Requisition List of materials for owner direct purchase greater than $5,000 in aggregate value.

   b. Signed and Completed Purchase Order Requisition (POR) form.

2. Without the above documentation NO purchase order will be issued.

G. 3.7 Permits, Fees, Notices and Compliance with Laws

1. Delete § 3.7.2 and substitute the following:

§ 3.7.2 The Contractor shall comply with required applicable laws, statutes, ordinances, codes, rules and regulation, and lawful orders of public authorities, applicable to performance of the Work. Contractor shall be responsible for notifying appropriate government agencies of the Contractor's need for inspections to meet required applicable laws, statutes, ordinances, codes, rules and regulation, and lawful orders of public authorities. The Contractor shall obtain from the appropriate government agencies a list of all systems and materials required to be inspected for occupancy.

2. ADD THE FOLLOWING SUBPARAGRAPH §3.7.6 TO 3.7:

§ 3.7.6 The Contractor shall meet the latest requirements of the United States Department of Labor Occupational Safety and Health Standards and comply with The Manual of Accident Prevention in Construction, all applicable safety and sanitary laws, regulations, and ordinances and any safety rules or procedures.

H. 3.9 Superintendent

1. Delete § 3.9.1 and substitute the following:

§ 3.9.1 The Contractor shall employ and keep at the site of the work during its progress a competent and thoroughly experienced superintendent capable of

handling all phases of the project. The Superintendent shall have any necessary assistants, foremen and timekeepers required by the scope of this project, and shall be acceptable to the Architect, and shall not be changed or transferred unless approved by the Architect, or ceases to be in the employ of the Contractor. If the Contractor must replace the Superintendent for any reason between "Notice-to-Proceed" and final Architect's certification of completion of the work, then the Contractor shall notify Architect that the existing Superintendent will be leaving the job on a specific date 7days prior to and that all job work shall cease after said date until a satisfactory replacement Superintendent is found, acceptable to the Architect, and physically present on the site, properly authorized and briefed by Contractor on the status of the project.

2. Add the following §§ 3.9.4, 3.9.5, 3.9.6, 3.9.7, and 3.9.8 to § 3.9:

§ 3.9.4 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under a contract with the Contractor.

§ 3.9.5 The Superintendent shall represent the Contractor in the Contractor's absence and all directions given to the Superintendent shall be binding as if given to the Contractor. Major and important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case.

§ 3.9.6 The Contractor shall submit to the Architect the name of the proposed superintendent for the Contractor at the Pre-Construction Conference for the Architect's review and acceptance. The contractor shall provide the proposed superintendent's work experience resume that includes similar size and type projects. The superintendent shall attend the Pre-Construction Conference and all Progress Meetings.

§ 3.9.7 The Contractor's Supervision Team will remain on the job until punch list items are corrected, no exception.

§ 3.9.8 The Contractor shall give efficient supervision to the work, using the best skill and attention. The Contractor shall carefully study and compare all drawings, specifications and other instructions and shall report at once to the Architect any error, inconsistency or omission which is discovered but shall not be held responsible for their existence or discovery. The Contractor's Supervision Team shall be in attendance on the job a minimum of six (6) hours per working day from "Notice to Proceed" continuously through final approval of the work by the Architect. No work shall be allowed to transpire on the site unless the Superintendent is in attendance at the site.

I. 3.10 Contractors Construction Schedules

1. Add the following **§ 3.10.4, § 3.10.5, § 3.10.6, & § 3.10.7** to § 3.10:

§ 3.10.4 The contractor shall furnish, not later than 7 days of date established for commencement of work, a bar-chart schedule showing the expected times of completion of the various stages of work on this project. The work headings therein shall correspond generally with the headings listed in the Contractor's Schedule of Values. During progress of the work the Contractor shall enter on the schedule the actual progress at the end of each month, and shall deliver two (2) copies to the Architect along with the Contractor's pay request. **Contractor's pay request will not be processed until receipt and review of monthly updated bar-chart schedule**.

§ 3.10.5 The Contractor shall furnish sufficient forces, construction plant and equipment, and shall work such hours, including night shifts and overtime operations, as may be necessary to ensure the prosecution of the Work in accordance with the approved construction schedule to insure the project is completed by the completion date. If, due to the Contractor, the Project falls behind the critical path so that the Project will not be finished by the Project Completion Date the Contractor shall take such steps as may be necessary to improve the progress by increasing the number of shifts, overtime operations, days of work and the amount of construction plant, all without additional cost to the Owner.

§ 3.10.6 Failure of the Contractor to comply with the requirements under this provision shall be grounds for determination by the Architect that the Contractor is not prosecuting the work with such diligence as will ensure completion within the time specified and such failure constitutes a substantial violation of the conditions of the Agreement.

§ 3.10.7 Upon such determination by the Architect and after the Contractor has been provided with a reasonable opportunity to cure such issues, the Owner may terminate the Contractor's right to proceed with the Work, or any separable part thereof, in accordance with Article 14 of the General Conditions, or may withhold further payments as indicated in Article 9.5.1.

J. 3.11 Documents and Samples at the Site

1. Add the following to § 3.11:

   Insert the Section designator '**§ 3.11.1**' at the beginning of the existing paragraph.

2. Add the following § 3.11.2 to § 3.11:

   § 3.11.2 Copy of Toxic Substance List submitted by both the Contractor and Subcontractors to the Owner, must be kept at the site during the duration of construction.

K. 3.12 Shop Drawings, Product Data and Samples

1. Add the following **§§ 3.12.11**, **3.12.12, 3.12.13, and 3.12.14** to **§ 3.12:**

§ 3.12.11 Submission of Shop Drawings, Product Date, et al and samples shall be accompanied by transmittal letter, containing project name, Contractor's name, Contractor's approval stamp, number of drawings and samples, titles and other pertinent data. Shop drawings are to be electronically submitted to the Architect. Refer to Division 1 Section "Submittal Procedures."

§ 3.12.12 The Contractor shall review, stamp with his approval and submit, with reasonable promptness, and in orderly sequence so as to cause no delay in the Work or in the Work of any other contract, all Shop Drawings, Product Data, and Samples required by the Contract Documents or subsequently by the Architect as covered in Modifications with all required information provided at one time per each specification section. Submittals shall be properly identified as specified, or as the Architect may require. At the time of submission the Contractor shall inform the Architect in writing of any deviation in the shop drawings and product data from the requirements of the Contract Documents. If the shop drawings do not conform completely to the requirements of the Contract Documents, such nonconformance shall be specifically noted on the face of the submittal. Refer to Division 1 Section "Submittal Procedures."

§ 3.12.13 The Architect will review Shop Drawings and Samples with reasonable promptness to cause no delay, but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's approval of a separate item shall not indicate approval of an assembly in which the item functions.

§ 3.12.14 The Contractor shall make any corrections required by the Architect and shall resubmit the required number of corrected copies of Shop Drawings or new Samples until reviewed by the Architect and it's consultants. The Contractor shall direct specific attention in writing or on re-submitted Shop Drawings to revisions other than the corrections requested by the Architect on previous submissions.

L. 3.13 Use of Site

1. Add the following to § 3.13:

   Insert the Section designator '**§ 3.13.1**' at the beginning of the existing paragraph.

2. Add the following § 3.13.2 to § 3.13:

   § 3.13.2 Contractor shall access the Project site from roadways, right-of-ways, easements or temporary roadways as authorized by the Owner and shall limit construction traffic from residential areas by utilizing through streets within commercial districts. Use of multiple project site access points shall be at the discretion of the Owner.

   The Contractor shall present a plan, for approval by the Architect and Owner, showing all areas for safety fencing staging, storage, job office, ingress and egress to the site. No sitework shall start until this plan is provided and reviewed

by the Architect and Owner. Revise project site access plan as necessary to comply with Architect's direction if given.

M. 3.15 Cleaning Up

1. Add the following § 3.15.3 to § 3.15:

§ 3.15.3 The Contractor shall keep interior of the building clean on a daily basis and keep the area around the building free of stored or unattended combustible materials.

N. 3.18 Indemnification

1. Delete § 3.18.1 and substitute with the following:

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall, for the sum of ten dollars ($10.00) and other good and valuable consideration paid by the Owner and the Architect/ Engineer individually, receipt hereby acknowledged by the Contractor, Indemnify and hold harmless the Owner and the Architect/ Engineer and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees arising out of or resulting from the performance of the Work provided that any such claim, damage, loss or expense: (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property other than the Work itself, including the loss of use resulting therefrom and (2) is caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Paragraph 3.18.

2. Delete § 3.18.2 and substitute the following:

§ 3.18.2 The indemnification which the Contractor and Subcontractors are to provide under Paragraph 3.18 shall include, extend and insure to and be for the benefit of the Owner, Architect, their respective agents, and employees of any of them, and shall not be limited in any way by any limitation on the amount of type of damage, compensation or benefits payable by or for the Contractor or any Subcontractor under Worker's Compensation or Employer's Liability Acts, disability acts, employee benefit acts or other legislation or rule of law, whether legislative, judicial, administrative or common law.

O. 3.19 Special Job Conditions

1. Add the following **§ 3.19 Special Job Conditions**:

3.19.1 There shall be no smoking or use of tobacco products allowed in any facility or on any real or personal property owned by or under the control of the Owner. Contractor and Subcontractor's employees are required to leave the site for tobacco use.

3.19.2 The Contractor and/or Subcontractor and their employees shall refrain from use of vulgarities around personnel.

3.19.3 Clothing shall have no vulgarities or sexually suggestive graphics.

3.19.4 Direct contact with staff is strictly prohibited.

3.19.5 Violation of Special Conditions may result in immediate termination of that employee or Subcontractor.

2.4 ARTICLE 4: ADMINSTRATION OF THE CONTRACT

A. 4.1 General

1. Add the following § 4.1.3 & § 4.1.4 to § 4.1:

§ 4.1.3 Nothing contained in the Contract Documents shall create any contractual relationship between the Architect and the Contractor.

§ 4.1.4 The Owner and the Architect will not be responsible for the acts or omissions of the Contractor and Subcontractors, or any of their agents or employees, or any other persons performing any of the work.

2.5 ARTICLE 5: SUBCONTRACTORS

A. 5.3 Subcontractural Relations

1. Add the following to § 5.3:

Insert the Section designator '**§ 5.3.1**' at the beginning of the existing paragraph.

2. Add the following § 5.3.2 & § 5.3.3 to § 5.3:

§ 5.3.2 Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or Architect and any Subcontractor or Sub-subcontractor.

§ 5.3.3 All work performed for the Contractor by a Subcontractor shall be pursuant to an appropriate agreement between the Contractor and the subcontractor (and where appropriate between Subcontractors and Sub-subcontractors) which shall contain provisions that:

5.3.3.1 Preserve and protect the rights of the Owner and the Architect under the Contract with respect to the Work to be performed under the subcontract so that the subcontracting thereof will not prejudice such rights;

5.3.3.2 Require that such Work be performed in accordance with the requirements of the Contract Documents;

5.3.3.3 Require submission to the Contractor of applications for payment under each subcontract to which the Contractor is a party, in reasonable time to enable the Contractor to apply for payment in accordance with Article 9;

5.3.3.4 Require that all claims for additional costs, extensions of time, damages for delays or otherwise with respect to subcontracted portions of the Work shall be submitted to the Contractor (via any Subcontractor or Sub-subcontractor where appropriate) in the manner provided in the Contract Documents for like claims by the Contractor upon the Owner.

5.3.3.5 Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in Article 11, except such rights as they may have to the proceeds of such insurance held by the Owner as trustee under Article 11; and,

5.3.3.6 Obligate each Subcontractor specifically to consent to the provisions of this Paragraph 5.3.

2.6 ARTICLE 7: CHANGES IN THE WORK

A. 7.2 Change Orders

1. Add the following §§ 7.2.2, 7.2.3, 7.2.4, 7.2.5, 7.2.6, 7.2.7, 7.2.8 & 7.2.9 to §7.2:

§ 7.2.2 The Contract Sum and the Contract Time may be changed only be a Change Order.

§ 7.2.3 The Contractor is responsible for all affected work that is a result of a Change Order. All changes required as a result of a Change Order should be reflected in the price of the Change Order. Any associated additional work that becomes evident after the Change Order has been signed will be made at the Contractor's expense.

§ 7.2.4 When any one change increases or decreases the scope of the original contract, the proposal to change shall be supported by accurate cost data establishing the fair and current market value of the labor, materials, equipment, and incidentals required to accomplish the change, plus a margin to represent the contractor's profit and overhead. Cost data shall be in sufficient detail to enable any qualified architect or engineer to confirm the accuracy of such proposal. Profit and overhead shall be added to additive change orders and shall be deducted on deductive change orders. No deduction shall be made for profit and overhead on deductive change orders in connection with Direct Material Purchases.

§7.2.5 The percentage fee for overhead and profit combined, to be added to the Cost of the Change in determining the total cost to the Owner, shall be 15% of the net increase in the Cost of the Work. Overhead & profit shall be further defined per **§7.3.11.**

§ 7.2.6 Cost shall be limited to the following: Cost of materials, including sales tax and cost of delivery, cost of labor, including Social Security, Old Age and Unemployment Insurance; Worker's Compensation Insurance; rental value of power tools and equipment. Overhead shall include the following: Bond premiums, supervision, superintendence, wages of timekeepers, watchmen and clerks, small tools, incidentals, general office expense and all other expenses not included in "cost." If the net value of a change results in a credit from the Contractor or Subcontractor, the credit given shall be the net cost. The cost as used herein shall include all items of labor, materials and equipment.

§ 7.2.7 The Contractor shall not be entitled to any claim for damages or cost including loss of profits, loss of use, overhead expenses, equipment rental, etc. on account of hindrances or delays from any cause whatsoever. If the hindrance or delay is caused by any act of God, or by any act or omission on the part of the Owner, Owner's agents, or governmental agencies having jurisdiction, such act, hindrance, or delay may entitle the Contractor to an extension of time only in which to complete the work which shall be determined by the Architect and approved by the Owner, provided that the Contractor will give written notice as provided herein of the cause of such act, hindrance, or delay. Any such claim shall be accompanied by an documentation from the Contractor showing how the delay has negatively impacted the Critical Path of construction operations.

§ 7.2.8 Should concealed conditions encountered in the performance of the Work below the surface of the ground be at variance with the conditions indicated by the Contract Documents or should unknown physical conditions below the surface of the ground of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Contract be encountered, the Contract Sum and Contract Time shall be equitably adjusted by Change Order upon claim by either party made within five days after the first observance of the conditions.

§ 7.2.9 Should any Changes to the Contract increase or decrease the Contract Amount by $25,000 or more such change must be approved by the Board Of County Commissioners in the form of a Change Order.

B. 7.3 Construction Change Directives

1. Delete § 7.3.4 and substitute the following:

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an allowance for overhead and profit in accordance with Clauses § 7.3.11.1 through § 7.3.11.6.

2. Delete § 7.3.4.5 and substitute the following:

§ 7.3.4.5 Cost of supervision and field personnel and other extended overhead expenses may be allowed when a contract time extension is allowed, which is directly attributed to the change.

3. Add the following § 7.3.11 to § 7.3:

§ 7.3.11 Subparagraph 7.3.4, the allowance for the combined overhead and profit in the total cost to the Owner shall be based on the following schedule:

.1 For the Contractor, for Work performed by the Contractor's own forces, a maximum of fifteen percent (15%) of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractor, a maximum of seven and one-half percent (7-1/2%) of the amount due the Subcontractor.

.3 For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, a maximum of fifteen percent (15%) of the cost.

.4 For each Subcontractor for work performed by the Subcontractor's Sub-subcontractors, a maximum of seven and one-half percent (7-1/2%) of the amount due the Sub-subcontractors.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.4.

.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also. In no case will a charge over $1,000.00 be approved without such itemization.

C. 7.5 Force Majeure

1. Add a new Section 7.5 as follows:

§7.5 Force Majeure

§7.5.1 The Contractor shall not be deemed to be in breach of this Contract, if performance by the Contractor (to include any of its Subcontractors or suppliers) in a timely, proper, efficient, and cost effective manner is prevented or adversely affected by fire, flood, hurricane, tornado, storm, unavoidable casualty, pestilence, earthquake, Acts of God, unusual delay in transportation, labor disputes, shortages or unavailability of labor or materials, civil commotion, national emergency, war or warlike operations, sabotage, terrorist attack, vandalism, government regulations, government controls, governmental action, court order, price escalation, or any other event, occurrence, or cause which is

without fault of and beyond the reasonable control of the Contractor (collectively referred to as “Force Majeure”).

§7.5.2 Upon a circumstance of Force Majeure, the Owner shall issue a Change Order to the Contractor extending Contract Time commensurate with the delay attributable to the Force Majeure and increasing the Contract Sum for the costs arising from or related to the Force Majeure not paid by insurance.

2.7 ARTICLE 8: TIME

A. 8.1. Definitions

1. Subparagraph 8.1.2 is amended to read as follows:

   § 8.1.2 The date of commencement of the Work is the date established in a Notice to Proceed. If there is no Notice to Proceed it shall be the date of the Agreement.

2. Subparagraph 8.1.3 is amended to read as follows:

   § 8.1.3 The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Architect when construction is sufficiently complete and all Safety to Life conditions of the Code are complete, in accordance with the Contract Documents, so the Owner may occupy the Work, or designated portion thereof, for the use for which it is intended without any further interference by the Contractor’s work except for punch list items. The Architect shall provide the Owner with written certification that the work is substantially complete and ready for occupancy and establish an effective date; said certification to be provided on the effective date.

3. Add the following paragraph:

   § 8.1.5 The Date of Final Acceptance of the Work is the date certified by the Architect when construction is complete in accordance with the Contract Documents. Final Acceptance of the work shall not be accomplished until after the Contractor has completed all work required by the Contact Documents, to include correction of all punch list items contained in punch lists prepared by the Architect. Architect will certify to the Owner that all work has been accomplished, to include punch list items, and establish and effective date. The Request for Final Payment shall reflect the date of final acceptance. THE DATE OF FINAL ACCEPTANCE SHALL BE THE BEGINNING OF ALL WARRANTIES.

B. 8.2 Progress and Completion

1. Add the following §§ 8.2.4, 8.2.5 and 8.2.6 to § 8.2:

   § 8.2.4 The work to be performed under the Contractor’s Base Proposal as defined in the Contract Documents shall be substantially completed as defined per signed contract between Owner and Contractor.

§ 8.2.5 Failure to complete the Project within the time fixed in this Agreement will result in substantial injury to the Owner, and as damages arising from such failure cannot be calculated with any degree of certainty, according to the definition of " Substantial Completion" in § 9.8.1 of the General Conditions, within the time fixed or within such further time, if any, as maybe authorized in accordance with Contract Documents, the Contractor shall pay to the Owner as Liquidated Damages for such delay, and not as a penalty, a sum per below schedule for each and every calendar day beginning on the first day after the contractor fails to achieve Substantial Completion within the Contract Time until the date that such Substantial Completion is achieved. It is also hereby agreed that if after thirty **(30)** Calendar days after Substantial Completion this Project is not fully and finally completed in accordance with the requirements of the Contract Documents, the Contractor shall pay to the Owner as Liquidated Damages, and not as a penalty, for such delay, **1/2** of the rate previously indicated. These Liquidated Damages shall be payable in addition to any expenses or costs payable by the Contractor to the Owner under the provision of the Contract Document and shall not exclude the recovery of damages of the Owner under the Contract Documents. This provision of Liquidated Damages for delay shall in no manner affect the Owner's right to terminate the Contract. The Owner's exercise of the right to terminate shall not release the Contactor from his obligation to pay Liquidated Damages. It is further agreed that the Owner may deduct from the balance of the Contract Sum held by the Owner the Liquidated Damages stipulated herein or such portions, as said balance will cover.

C. **§ 8.2.7** Applicable liquidated damages are the amounts established in the following schedule:

Original Contract Amount	Daily Charge Per Calendar Day
$299,999 and under	$904
$300,000 but less than $2,000,000	$1,685
$2,000,000 but less than $5,000,000	$2,667
$5,000,000 but less than $10,000,000	$3,813
$10,000,000 but less than $20,000,000	$5,021
$20,000,000 but less than $40,000,000	$7,442
$40,000,000 and over……	$10,224 plus 0.00005 of any amount over $40 million (Round to the nearest whole dollar)

D. 8.3 Delays and Extensions of Time

1. Amend Section **§** 8.3.1 to replace wording after "(5) by other causes that Contractor asserts," with the following language:

   "then the Contract Time and the Contract Sum shall be adjusted for such additional time and extra costs attributable to such delay"

2. Add the following **§ 8.3.1.1** to **§ 8.3.1**:

§ 8.3.1.1 Extension of Time
Extensions on all additions will be granted only to such conditions are in excess of the average for that period and also that the weather actually affects operations.

3. Add the following to the end of **§ 8.3.2**:

Weather logs shall be submitted monthly with the Pay Application. The Contractor shall submit the referenced climatologically summary data immediately upon its availability and shall show how the time extension request corresponds with the climatological data. Extension of contract time due to adverse weather shall be for "**time only**" and will not be the basis of any monetary claim or request for "extended general conditions." Refer to Section 00 73 80 "Weather Delay Log" and Section 01 33 10 "Weather Table".

4. Add the following §§ 8.3.4, 8.3.5, 8.3.6, 8.3.7, 8.3.8, 8.3.9 and 8.3.10 to § 8.3:

§ 8.3.4 The Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine and as approved by the Owner.

§ 8.3.5 All Claims for extension of time shall be made in writing to the Architect no more than thirty (30) days after the Occurrence of the delay; otherwise they shall be waived. In the case of a continuing delay only one claim is necessary.

§ 8.3.6 It is mutually agreed between the parties that time is of the essence of this contract, and that there will be, on the part of the Owner considerable monetary damage in the event the work is not completed within the time fixed for completion in the Contract or within the time to which such completion may have been extended.

§ 8.3.7 The amount per calendar day set forth herein for each day that said Contract is not completed is hereby agreed upon as the liquidated damages for each and every calendar day that the time consumed in completing the work under the contract exceeds that time allowed therefore.

§ 8.3.8 The amount shall, in no event, be considered as a penalty or otherwise than as liquidated and adjusted damages to the Owner of the said Project, and the Contractor and his sureties shall be liable therefore.

§ 8.3.9 The Contractor agrees to make no claim for damages for delay in the performance of the contract occasioned by any act or omission of the Owner or any of its agents or representatives, or because of any injunction which may be brought against the Owner and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the Work as provided herein.

§ 8.3.10 No extension of time beyond the date of completion fixed by terms of the Contract shall be effective unless in writing, submitted to the Architect, and approved by Owner. The determination made by the Owner on an application for an extension of time shall be binding and conclusive on the Contractor.

2.8 ARTICLE 9: PAYMENTS AND COMPLETION

A. 9.3 Applications for Payment

1. Add the following § 9.3.1.3 to § 9.3.1:

   § 9.3.1.3 The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Architect (or if the Surety withholds its consent), or for other good and sufficient reasons.

2. Add the following § 9.3.2.1 to § 9.3.2:

   § 9.3.2.1 Payment for stored equipment or materials will be made only when said materials or equipment are stored on site or in a bonded warehouse.

3. Add the following § 9.3.3.1 to § 9.3.3:

   § 9.3.3.1 The Contractor warrants and guarantees that title to all Work, materials and equipment covered on the Application for Payment, whether incorporated in the Project of not, will pass to the Owner upon the receipt of such payment by the Contractor, free and clear of all liens, claims, security interest or encumbrances, hereinafter referred to in this Article 9 as liens, and that no Work, materials, or equipment covered by and Application for Payment will have been acquired by the Contractor, or by any other person performing the Work at the site or furnishing materials and equipment for the Project subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

4. Add the following paragraphs to § 9.3.3:

   § 9.3.4 On the twenty fifth day of each month, the Contractor shall submit to the Architect an itemized Application for Payment and Certificate for Payment, for operations completed in accordance with the schedule of values. Such application shall be notarized, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for elsewhere in the Contract Documents.

   § 9.3.5 The Contractor shall submit with each progress payment a "Payment Certificate" (AIA Form G702) that identifies the project, contractor and date, which certifies the following:

   § 9.3.5.1 The percent complete based upon the plans and specifications.

   § 9.3.5.2 All claims for labor and materials have been paid or will be paid with the proceeds of this requisition.

   § 9.3.5.3 Statement that there are no liens other than permitted encumbrances outstanding against such portions of the project.

§ 9.3.5.4 All construction completed to date has been done in accordance with the plans and specifications relating thereto.

§ 9.3.5.5 All required surety bonds are in full force and effect.

§ 9.3.5.6 The building can be completed in accordance with plans, and specifications, and the project budget relating thereto, on or before the estimated completion date as modified, pursuant to the construction contract between the contractor and the Owner.

B. 9.4 Certificates for Payment

1. Add the following § 9.4.1.1 to § 9.4.1:

§ 9.4.1.1 The Owner shall make payment no later than the tenth of day of the month subject to receiving the Architect accepted Certificate for Payment no later than the last day of the preceding month.

2. Add the following § 9.4.3, 9.4.4, 9.4.5, and § 9.4.6 to § 9.4:

§ 9.4.3 No Certificate for a progress payment, not any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of the Work not in accordance with the Contract Documents.

§ 9.4.4 The Architect shall certify a payment of ninety percent (90%) of the value of the Work and materials as above noted according to his best judgment of the correct amount.

§ 9.4.5 On these monthly certificates, ten percent (10%) of the total of the estimated work for that month shall be retained until completion and acceptance of the job.

§ 9.4.6 Upon substantial completion of the job, the Architect may issue a semi-final certificate covering payment up to ninety percent (90%) of the Contract Sum less any reserves to cover any incomplete items.

C. 9.6 Progress Payments

1. Add the following to **§ 9.6.2**:

§ 9.6.2.1 The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor under Article 11, and he shall require each Subcontractor to make payments to his subcontractors.

§ 9.6.2.2 The Contractor shall remit payment due to those Subcontractors and suppliers within 10 days after receipt of payment. Contractor shall require each subcontractor to make payments to their subcontractors as follows:

§ 9.6.2.2.1 When a subcontractor receives payment from the Contractor, the subcontractor shall remit payment due to his subcontractors and suppliers within 7 days after the subcontractor's receipt of payment.

2. Add the following to **§ 9.6**:

§ 9.6.9 Neither the Owner nor the Architect shall have any obligation to pay or to see the payments of any moneys to any Subcontractors except as otherwise may be required by Florida Statutes. Payment to material suppliers shall be treated in a manner similar to subcontractors.

§ 9.6.10 All payments due for the purchase of construction services and not made within the applicable time limits shall bear interest at the rate of one percent (1%) per month.

D. 9.7 Failure of Payment

1. Add the following to § 9.7:

Insert the Section designator '**§ 9.7.1**' at the beginning of the existing paragraph.

2. Add the following § 9.7.2 to § 9.7:

§ 9.7.2 Payments to Subcontractors
§ 9.7.2.1 If the Architect fails to issue a Certificate for Payment for any cause which is the fault of the Contractor and not the fault of a particular Subcontractor, the Contractor shall pay that Subcontractor on demand, made at any time after the Certificate for Payment should otherwise have been issued for his work to the extent completed, less the retained percentage.

§ 9.7.2.2 The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor under Article 11, and he shall require each Subcontractor to make payments to his subcontractors.

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

§ 9.7.2.4 Neither the Owner nor the Architect shall have any obligation to pay directly or to see the payments of any moneys directly to any Subcontractor except as may otherwise be required by applicable laws and statutes. Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.7.2.1, 2, and 3.

E. 9.10 FINAL COMPLETION AND FINAL PAYMENT

1. Add the following § 9.10.1.1 to § 9.10.1:

§ 9.10.1.1 As a condition precedent to Final Payment, all punch list items and all conditional final lien waivers and affidavits, warranties, guarantees, and assignments thereof required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Architect and Owner as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees and their assignments

have been received by the Owner along with a fully executed Certificate of Completion, along with the following documents, other Project documentation for close out such as warranties, guarantees, assignments, certificates for occupancy, roofing certifications, as-built drawings, operation and maintenance manuals, Subcontractor and vendor contact information, and acceptance letters as required by the Owner and/or Contract Documents.

2.9 ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

A. 10.4 Emergencies

1. Add the following § 10.4.1 to § 10.4:

§ 10.4.1 The Contractor shall provide at the site, and make available to all workers, medical supplies and equipment necessary to supply first aid service to all persons injured in connection with the work. The Contractor shall report any and all accidents in writing to Insurance Company, Owner and Architect within twenty-four (24) hours of the occurrence. The report shall contain the following information and it shall be the responsibility of the Contractor to have an accident report filled out in triplicate and submitted as required above with (1) Name of Person or Persons and Home Address, (2) Location of Occurrence, (3) Time of Day and Date, (4) Description of Occurrence, (5) Statements of Witnesses and (6) Signature of Contractor's Superintendent. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger. If any claim is made by anyone against the Contractor or any Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Owner, giving full details of the Claims.

2.10 ARTICLE 11: INSURANCES AND BONDS

A. 11.1 Contractor's Liability Insurance

1. Delete § 11.1.1 and substitute the following:

11.1.1.1 The Contractor shall not commence work under the Contract until it has obtained and included as a cost of the work all insurance required by the Contract Documents and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on any subcontract until the same insurance requirements have been complied with by each subcontractor.

11.1.1.2 Nothing contained in these insurance requirements shall be construed as limiting the extent of the Contractor's responsibility for payment of damages resulting from its operations under this contract. The Contractor agrees that it alone shall be completely responsible for procuring and maintaining full insurance coverage as provided herein or as may be otherwise required by the Contract Documents.

§ 11.1.1.3 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the State of Florida such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. All insurance policies shall be issued and countersigned by representatives of such companies duly authorized for the State of Florida and shall be written on ISO standard forms or their equivalents. The Contractor shall provide the ISO Commercial General Liability policy for general liability coverage. All liability policies shall provide that the Owner is a named additional insured as to the operations of the Contractor under the Agreement and shall provide for the Severability of Insureds Provision. The Owner shall be exempt from, and in no way liable for, any sums of money, which may represent a deductible in any insurance policy. The payment of such deductible shall be the responsibility solely of the Contractor and/or Subcontractor providing such insurance. The insurance shall protect the Contractor from the following claims:

.1 claims under workers' or workmen compensation, disability benefit and other similar employee benefit acts, which are applicable to the Work to be performed;
.2 claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
.3 claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
.4 claims for damages insured by usual personal injury liability coverage including claims, which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
.5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
.6 claims for damages because of bodily injury, death of a person or property damages arising out of ownership, maintenance or use of a motor vehicle;
.7 claims for bodily injury or property damage arising out of completed operations; and
.8 claims involving contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18.

2. Add the following **§ 11.1.1.4** , and its subparagraphs to **§ 11.1**:

§ 11.1.1.4 Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment. The insurance required by Subparagraph 11.1.1 shall include contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18 and coverage for the "XCU" exposure.

.1 Worker's Compensation: The Contractor shall secure and maintain for the life of this Agreement, valid Worker's Compensation Insurance as required by Chapter 440, Florida Statutes and employer's liability insurance meeting

minimum statutory limits. Copies of the insurance policy shall be filed with the Owner no later than 30 days after execution of the Owner-Contractor Agreement.

.2 Automobile Liability: The Contractor shall secure and maintain, during the life of this Agreement, Automobile Liability insurance on all vehicles used in connection with the contract whether owned, non-owned, or hired against bodily injury and property damage.

3. Add the following **§ 11.1.1.5** to **§11.1** :

§ 11.1.1.5 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These Certificates and the insurance policies required by § 11.1 shall contain a provision that coverages afforded under the policies will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by § 9.10.2. The Contractor shall furnish one copy each of Certificates of Insurance for each copy of the Agreement which shall specifically set forth evidence of all insurance coverage required by the Contract Documents. The Certificate of Insurance shall be dated and show the name of the insured Contractor, the specific job by name and job number, the name of the insurer, the number of the policy, its effective date, and its termination date. The Contractor shall furnish a copy of the insurance policy to the Owner within thirty (30) days following execution of the Agreement. If the Acord form certificate is used, the Supplemental Attachment form, AIA document G715, shall be completed, signed by Contractor's insurance representative and attached to the Acord certificate.

4. Add the following § 11.1.1.6, and its subparagraphs to § 11.1:

§ 11.1.1.6 The insurance required by § 11.1.1 shall be written for not less than any limits of liability set forth below, required by Law or set forth in the Contract Documents, whichever is greater. Other types as may be required by the Project Specifications shall also be furnished.

§ 11.1.1.6.1 FURNISH TO THE OWNER A LETTER FROM THE INSURANCE COMPANY STATING THAT ALL REQUIRED INSURANCE HAS BEEN COMPLIED WITH AS SPECIFIED.

§ 11.1.1.6.2 THE OWNER, AND THE ARCHITECT, DAG Architects Inc. shall be named as an ADDITIONAL INSURED on the Contractor's general liability policies. (Being named as Certificate Holder is not acceptable).

§ 11.1.1.6.3 INSURANCE MUST BE MAINTAINED FOR ONE (1) YEAR AFTER FINAL PAYMENT if written on a claims-made basis.

§ 11.1.1.6.4 All insurance shall contain provision that coverage afforded under the policies SHALL NOT BE CANCELED OR MODIFIED UNTIL A MINIMUM OF FIFTEEN (15) DAYS PRIOR WRITTEN NOTICE TO OWNER HAS BEEN GIVEN,

AND THIS PROVISION SHALL BE NOTED ON CERTIFICATES OF INSURANCE.

§ 11.1.1.6.5 Deliver to the Architect, before work commences, two (2) certificates evidencing compliance with all required insurance, using AIA Document G705, Certificate of Insurance.

§ 11.1.1.6.6 Insurance required shall include Contractual Liability Insurance applicable to the Contractor's obligations under Article 3.

§ 11.1.1.6.7 Property Insurance coverage shall include coverage of perils of windstorms, fire, lightning vandalism, malicious mischief and those included in extended coverage in the amount of one hundred percent (100%) of the values at risk. Extended coverage, vandalism, and malicious mischief insurance may contain the standard deductibles.

§ 11.1.1.6.8 Contractor shall maintain valid Worker's Compensation Insurance as required by Chapter 440, Florida Statutes. All Subcontractors shall maintain valid Worker's Compensation as required by Florida Statutes.

§ 11.1.1.6.9 Contractor shall maintain Public Liability Insurance against bodily injury, personal injury and property damage, in limits as specified. Coverage shall include Comprehensive General Liability and Products and Completed Operations Liability.

§ 11.1.1.6.10 The amounts set forth herein and by Law shall apply equally or whether on or off the site of the Work.

§ 11.1.1.6.11 Unless otherwise provided in the Contract Documents, property insurance shall cover portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also portions of the Work in transit

B. 11.2 Property Insurance

1. Delete § 11.2.1 through § 11.2.3 and substitute the following to § 11.2:

§ 11.2.1 It is the Contractor's responsibility to obtain, purchase and maintain property coverage's (Builder's Risk) shall be written for one hundred percent (100%) of the values at "all risk."

§ 11.2.1.1 Such policy shall include the interest of Owner, Contractor, Subcontractors, and Sub-subcontractors or any other parties involved in the project. Perils insured shall be "All Risks" including, but not limited to the following, theft, vandalism, malicious mischief, collapse, flood, earthquake, windstorm, sinkhole, falsework, testing and startup, temporary buildings and debris removal, including demolition. Contractor remains responsible for any deductible under such policy.

§ 11.2.1.2 Any insured loss is payable to the Owner as trustee for the insured, as their interest may appear.

§ 11.2.1.3 The Contractor shall file a copy of all policies with the Owner before an exposure to loss may occur.

2. Add the following §§ 11.2.1.4 and 11.2.1.5 to § 11.2:

§ 11.2.1.4 If the Owner requests in writing that other special insurance be included in the property insurance policy, the Contractor shall, if possible, include such insurance, and the cost thereof shall be charged to the Owner by appropriate Change Order.

§ 11.2.1.5 The Owner and Contractor waive all rights against each other for damages caused by fire or other perils to the extent covered by insurance provided under this paragraph, except such rights as they may have to the proceeds of such insurance held by the Owner as trustee. The Contractor shall require similar waivers by Subcontractors and Sub-subcontractors

3. Delete § 11.3.2 and substitute the following:

§ 11.3.2 Boiler and Machinery Insurance: The Contractor shall purchase and maintain an appropriate installation floater which shall specifically cover such insured objects which are subject to the boiler and machinery hazards during installation and until formal acceptance by the Owner.

4. Add the following § 11.3.3.1, 11.3.3.2, and 11.3.3.3 to § 11.3.3:

§ 11.3.3.1 Before an exposure to loss may occur, the Contractor shall file with the Owner a copy of each policy that includes insurance coverage required by **§** 11.1.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner.

§ 11.3.3.2 A loss insured under property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the Insured, as their interests may appear. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Subcontractors in similar manner.

§ 11.3.3.3 The Owner as fiduciary shall, upon occurrence of an insured loss, deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or in accordance with an award as provided in Paragraph 4.5. If after such loss no other special agreement is made, replacement of damaged property shall be covered by an appropriate Change Order.

C. 11.1 Performance Bond and Payment Bond

1. Delete § 11.1.2. and substitute the following:

§ 11.1.2 The Owner requires the Contractor to furnish a Performance Bond and Payment Bond in the amount of not less than 100% of the contract price for each type of bond, covering faithful performance of the contract and the payment of all obligations arising thereunder in such forms as the Owner may prescribe and with such securities as it may approve. The premium for the required bonds shall be paid by the Contractor. The Performance Bond shall extend as a guarantee bond for one (1) year after final acceptance of the Work, or until specified guarantees, which exceed one year are satisfied.

D. Add the following Section:

§ 11.6 Insurance Requirements (Minimum)

§ 11.6.1 Worker's Compensation

Applicable	Per Florida Statute – Chapter 440
Railroad Required	NO
Maritime Required	NO
State:	Statutory
Federal, if applicable	Statutory
Employer's Liability:	
Bodily injury, each accident	$ 500,000
Bodily injury by disease, each employee	$ 500,000
Bodily injury/disease aggregate	$ 500,000

§ 11.6.2 CONTRACTOR'S LIABILITY INSURANCE including CONTRACTUAL LIABILITY

Form of Insurance shall be:

Comprehensive General Liability, Premises and Completed Operations, Contractual Liability, Broad Form.

a.	BODILY INJURY	
	Each Occurrence	$1,000,000
	Aggregate	1,000,000
b.	PROPERTY DAMAGE Including Complete Operations	
	Broad Form	Yes
	Each Occurrence	1,000,000
	Aggregate	1,000,000
c.	PERSONAL INJURY (WITH EMPLOYMENT EXCLUSION DELETED)	
	Each Occurrence	1,000,000
	Aggregate	1,000,000
d.	XCU COVERAGE included	Yes

§ 11.6.3 MOTOR VEHICLE LIABILITY – Owned, Non-Owned and Hired

a.	BODILY INJURY	
	Each Occurrence	1,000,000
	Aggregate	1,000,000
b.	PROPERTY DAMAGE	
	Each Occurrence	500,000
	Aggregate	1,000,000

§ 11.6.4 OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY INSURANCE

The Contractor shall provide an Owner's and Contractor's Protective Liability Policy with the following limits: (A separate policy in the name of the Owner must be provided.)

a.	BODILY INJURY	
	Each Occurrence	1,000,000
	Aggregate	1,000,000
b.	PROPERTY DAMAGE	
	Each Occurrence	1,000,000
	Aggregate	1,000,000
c.	PROPERTY INJURY	
	Each Occurrence	1,000,000
	Aggregate	1,000,000

d. Optionally, the Owner may purchase and maintain other insurance for self-protection against claims, which may arise from operations under the Contract.

§ 11.6.5 PROPERTY INSURANCE

a. To be purchased by Contractor: Builders Risk Insurance on completed value form in the names of the Owner, Architect, and Contractor as their interests may appear with limits in an amount equal to the Contract Sum for the work, including coverage for materials and equipment furnished by Owner to be incorporated or used in the project when stored off the site or when in transit. Coverage shall be provided on an all risk basis to include extended coverage for fire, lightning, wind storms, vandalism and malicious mischief.

E. Add the following Section:

§ 11.7 EVIDENCE OF INSURANCE COVERAGE

§ 11.7.1 Before commencement of any work, the Contractor shall submit written evidence that the minimum insurance required by the Contract Documents has been obtained. Such evidence shall be in the form of a Certificate of Insurance executed by the Contractor's insurance carrier showing such

policies in force for the specified period or by furnishing a copy of the actual policies. Each certificate shall contain an endorsement or statement waiving right of cancellation or reduction in coverage unless thirty (30) days prior written notice is given to the Owner by return receipt certified mail. No other form of notification will otherwise relieve the insurance company, its agents, or its representatives of responsibility.

§ 11.7.2 The Contractor shall furnish an original and certified copy of the property insurance policy to the Architect, one copy of which shall be for the Owner and one copy for the Architect.

2.11 ARTICLE 12: UNCOVERING AND CORRECTING WORK

1. Add the following paragraph:

§ 12.1.3 The obligations of the Contractor under Article 12 shall be in addition to and not in limitation of any obligations imposed upon him by special guarantees required by the Contract Documents or otherwise prescribed by law.

2.12 ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.4 TEST AND INSPECTIONS

1. Add the following paragraphs and subparagraphs:

§ 13.4.7 Neither the observations of the Architect in his administration of the Construction Contract, nor inspections, tests or approvals by persons other than the Contractor shall relieve the Contractor from his obligations to perform the work in accordance with the Contract Documents.

§ 13.4.8 All testing of materials, products, equipment, etc. shall be the responsibility of the Contractor as a cost of the work and the Contractor shall pay for all tests with the exception of:

§ 1**3.4.8.1** All Test and Balance Mechanical work shall be contracted for and paid for by the Contractor. The Contractor shall allow two weeks in the project schedule to perform Test and Balance. Test and Balance shall be done prior to Substantial Completion.

§ 13.4.8.2 All Geotechnical and subsurface investigation work which has already been performed by the Owner.

§ 13.4.8.3 The Owner reserves the right to approve or disapprove of the Testing Agency. The Contractor shall submit at the pre-construction conference the names(s) of the testing agency(s) he proposes to use for Owner’s approval.

2. Add the following new paragraphs:

§ 13.6 EQUAL OPPORTUNITY

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

13.6.2 The Contractor and all subcontractors shall, in all solicitations or advertisements 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, national origin or age.

END OF DOCUMENT 00 73 00

DOCUMENT 00 73 80 - WEATHER DELAY LOG

A. **Project:** Okaloosa County New Tax Collector's Office/County Government Services Building

B. **Date:** _____

C. **Weather Event:** _____

D. **Work on Progress:** _____

E. **Is the work on the Critical Path?** _____

F. **Length of Delay:** _____

G. **If the work is not on the Critical Path, how many days of delay until this work category will be on the Critical Path?** _____

Instructions:

1. The above information is required to be submitted with each payment request on a monthly basis. The NOA weather report and superintendents daily log must be submitted with weather extension request.
2. This information will be required as back-up to grant a Time Extension request for delays caused by weather events.
3. Direct delays for work stoppages that are on the critical path will be given accordingly.
4. Delays for work not on the critical path shall be logged and delay logs for that category of work shall be accumulated and submitted in the event the work enters the critical patch and causes a delay of the project.
5. Delays will be granted only on the basis of adverse effect on the Critical Path of work for the project.

References:

SECTION 01 33 10 - WEATHER TABLE - See Adverse Weather Days
SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS OF THE CONTRACT FOR CONSTRUCTION - Subparagraph 8.3.2:

Extension of time requests due to adverse weather shall be submitted within twenty (20) days after adverse weather. The Contractor shall submit the referenced climatologically summary data immediately upon its availability and shall show how the time extension request corresponds with the climatological data. Extension of contract time due to adverse weather shall be for "time only" and will not be the basis of any monetary claim or request for "extended general conditions."

Submitted by: _____

Signature: _____

General Contractor: _____

END OF DOCUMENT 00 73 80

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SECTION 01 10 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Name: Okaloosa County
New Tax Collector’s Office/County Government Services Building

B. Project Location: 1448 Commerce Drive
Crestview, FL 32539

C. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

D. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

E. Architect Project Number: 24044

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Building:

   a. The work of this project is indicated on the drawings, described in the project manual and drawings. The work is subject to the requirements of the Americans with Disabilities Act (ADA) and all applicable building codes and ordinances.
   b. The drawings, project manual, and the interior design manual and drawings are complimentary and what is required by any one shall be as binding as if required by all.

2. Sitework:
   Demolition
   Earthwork
   Paving and Grading
   Storm Sewer
   Sanitary Sewer
   Landscaping
   Irrigation
   Utilities
   Site Lighting

3. Construction:
   Earthwork
   Concrete Work
   Masonry
   Structural Steel work
   Cold Formed Steel work
   Insulation
   Roofing
   Doors, Windows And Storefronts
   Exterior Finishes
   Drywall
   Interior Finishes
   Painting
   Plumbing
   Fire Protection
   Mechanical
   Electrical
   Access Control
   Telecommunications

B. The above brief list does not preclude, or limit scope of work shown and as described in each perspective specification section and/or in each construction drawing in this Project Manual. All scope of work depicted shall be included in contract unless

specifically excluded in writing in from the Architect or unless indicated otherwise. See specification section “00 73 00 Supplementary Conditions” for further clarifications.

1.4 ACCESS TO SITE:

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

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

1. Limits: Confine construction operations to Limit site disturbance, including earthwork and clearing of vegetation, to 20'-0" beyond building perimeter; 10'-0" beyond surface walkways, patios, surface parking, and utilities less than 12" in diameter; 15'-0" beyond primary roadway curbs and main utility branch trenches; and 25'-0" beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area.

2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

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

B. General Contractor shall be responsible for leaving entire property free of any construction debris, graded smooth, and stabilized per contract documents. Refer to Civil drawings for additional site development information.

1.5 COORDINATION WITH OCCUPANTS:

A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.

On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.

4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.6 WORK RESTRICTIONS

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

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

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Consult with Local Authority Having Jurisdiction for procedures and restrictions for working during weekends and off hours.

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

1. Notify Owner not less than 7 days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

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

1. Notify Owner not less than 7 days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

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

1.7 SPECIFICATION AND DRAWING CONVENTIONS

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

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

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SECTION 01 11 00 – PRODUCT EVALUATION AND APPROVAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Florida Product Evaluation and Approval.

1.2 REFERENCES

A. Florida Statute 553.842

B. Florida Administrative Code 9B-72

C. Definition: Product evaluation and approval system that applies statewide to concurrent with the Florida Building Code.

1.3 RESPONSIBILITY

A. The Contractor is responsible for providing products approved by the State of Florida with approval numbers. **Do not use products that do not have a Florida approval number.**

B. See Structural drawings for design pressures for this specific project. Provide products that meet or exceed these requirements.

1.4 SUBMITTAL

A. Submit a copy of the approved product schedule, (attached at the end of this section), to the Architect within thirty (30) days after project has been awarded. In addition to State requirements comply with the requirements of the local jurisdiction of the project.

B. Submit the following product approval specification sheet, or local jurisdiction form to obtain a building permit.

C. If during the submittal process these proposed products do not meet this project manual's specifications and as determined by Architect, Contractor shall update this form and file with the local authority having jurisdiction to replace the one filled with the building permit once all submittals have been completed to the satisfaction of the Architect.

1.5 CATEGORIES

A. General: Products, methods, or systems of construction, used in the exterior envelope of a building must be approved by the Building Department. The products covered are those products, methods or systems that affect the structural integrity of the building envelope, including but not limited to the following categories.

1. Panel Walls
2. Exterior Doors
3. Roofing Products
4. Skylights
5. Windows
6. Shutters
7. Structural Components
8. New and Innovative Building Envelope Products

B. If the Contractor fails to comply with this requirement, non-complying components shall be removed and replaced with components that do comply at no expense to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PRODUCT APPROVAL SPECIFICATION SHEET

A. Project Name: Okaloosa County
New Tax Collector's Office/County Government Services Building

B. Project Location: 1448 Commerce Drive
Crestview, FL 32539

C. Owner: Board of County Commissioners of
Okaloosa County
1250 N. Eglin Parkway
Shalimar, FL 32579

D. Architect: DAG Architects, Inc.
1223 Airport Road
Destin, FL 32541
850-837-8152
www.dagarchitects.com

E. Architect Project Number: 24044

As required by Florida Statute 553.842 and Florida Administrative Code 9B-72, please provide the information and the product approval number(s) on the building components listed below if they will be utilized on the construction project for which you are applying for a building permit. We recommend you contact your local product supplier should you not know the product approval number for any of the applicable listed products. More information about statewide product approval can be obtained at www.floridabuilding.org. Use this form or the form required by the local authority having jurisdiction to acquire the building permit.

Category/Subcategory	Manufacturer	Product Description	Approval Number(s)
F. EXTERIOR DOORS			
1. Swinging			
2. Sliding			
3. Sectional			
4. Roll up			
5. Automatic			
6. Other			
G. WINDOWS			
1. Single hung			
2. Horizontal Slider			
3. Casement			
4. Double Hung			
5. Fixed			
6. Awning			
7. Pass -through			
8. Projected			
9. Mullion			
10. Wind Breaker			
11. Dual Action			
12. Other			

Category/Subcategory	Manufacturer	Product Description	Approval Number(s)
H. PANEL WALL			
1. Siding			
2. Soffits			
3. EIFS			
4. Storefronts			
5. Curtain walls			
6. Wall Louver			
7. Glass Block			
8. Membrane			
9. Greenhouse			
10. Other			
I. ROOFING PRODUCTS			
1. Asphalt Shingles			
2. Underlayments			
3. Roofing Fasteners			
4. Non-structural Metal Roof			
5. Built-Up Roofing			
6. Modified Bitumen			
7. Single Ply Roofing Sys			
8. Roofing Tiles			
9. Roofing Insulation			
10. Waterproofing			
11. Wood shingles /shakes			
12. Roofing Slate			
13. Liquid Applied Roof Sys			
14. Cements - Adhesives – Coatings			
15. Roof Tile Adhesive			
16. Spray Applied Polyurethane Roof			
17. Other			
J. SHUTTERS			
1. Accordion			
2. Bahama			
3. Storm Panels			
4. Colonial			
5. Roll-up			
6. Equipment			
7. Other			
K. SKYLIGHTS			
1. Skylight			
2. Other			
L. STRUCTURAL COMPONENTS			
1. Wood Connector/Anchor			
2. Truss Plates			

Category/Subcategory	Manufacturer	Product Description	Approval Number(s)
3. Engineered Lumber			
4. Railing			
5. Coolers - Freezers			
6. Concrete Admixtures			
7. Material			
8. Insulation Forms			
9. Plastics			
10. Deck - Roof			
11. Wall			
12. Sheds			
13. Other			
M. NEW EXTERIOR ENVELOPE PRODUCTS			
1.			
2.			
3.			
4.			

The products listed above do not demonstrate product approval at plan review. I understand that at the time of inspection of these products, the following information must be available to the inspector on the jobsite; 1) copy of the product approval, 2) the performance characteristics which the product was tested and certified to comply with, 3) copy of the applicable manufacturer's installation requirements.

I understand these products may have to be removed if approval cannot be demonstrated during inspection.

Submitted By: _____
(Print or Type Name of Company or Corporation)

Authorized Signature : _____
(Signature)

_____
(Type or Print Name)

Title: _____
(Owner/Partner/President/Vice President)

Date: _____

END OF SECTION 01 11 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements governing the following:

1. Lump-sum allowances.

1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and

materials ordered by Owner under allowance shall be included as part of the Contract Sum and **not part of the allowance**.

1.6 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space when available. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1:

1. Owner’s Contingency for unknown conditions 1%

2. Utility Tap Fees To be paid by Architect

B. Allowance No. 2:

1. Okaloosa Gas District – Main Gas Extension Fee ……..$30,500.00

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 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 the 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. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise 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 Part 3 "Schedule of Alternates" Article 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.

E. Selection: The “Schedule of Alternates” included at the end of this Section are not listed in any particular order or priority. The Owner can, in no particular order or priority, accept or reject, any, all, or none of the Alternate bids identified on the Bidders Bid Form that is most advantages to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 01: SITEWORK

1. Description:
   All exterior sitework 3’-0” beyond the building perimeter excluding the other additive alternatives per civil drawings.

B. Alternate No. 02: EAST PARKING LOT

1. Description:
   a. Repave the shared east parking lot and provide new striping.
   b. Add code compliant additional handicap parking spaces for Civic Center.
   c. Add landscaping islands and irrigation systems.
   d. Relocate light fixture poles.

C. Alternate No. 03: NEW COURTYARD

1. Description: .
   a. Provide sidewalks, seat walls, and landscaping.
   b. Provide Trellis Shade Structures.
   c. Provide Site Drainage.

D. Alternate No. 04: NEW CAMPUS SIGN @ HIGHWAY 85

1. Description: Per Title.

E. Alternate No. 05: STONE WAINSCOT FOR HALLWAYS 101 & 102, & 401, 402:

1. Description:
   a. Add Exterior Stone Cladding & Cast Stone for Wainscoting.
   b. Base bid will be rubber base and rubber chair rail.

F. Alternate No. 06: HARD CEILINGS FOR HALLWAYS 101 & 102, & 401, 402:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and can light fixtures.

d. See Mechanical & Electrical for further coordination.

G. Alternate No. 07: HARD CEILINGS FOR HALLWAYS 152,153,154:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and 2x2 light fixtures.
   d. See Mechanical & Electrical for further coordination.

H. Alternate No. 08: HARD CEILINGS FOR HALLWAYS 231,232:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide linear LED lighting and can light fixtures.
   c. Base bid will be acoustical ceiling tile and 2x2 light fixtures.
   d. See Mechanical & Electrical for further coordination.

I. Alternate No. 09: Wood Ceilings for Breakrooms 118 & 206:

1. Description:
   a. Provide wood panel ceiling system.
   b. Provide linear LED lighting.
   c. Base bid will be acoustical ceiling tile and 2x4 light fixtures
   d. See Mechanical & Electrical for further coordination.

J. Alternate No. 10: Tax Collector Lobby 103 Ceiling:

1. Description:
   a. Provide Gypsum board ceilings with wood slat ceiling system.
   b. Provide down lights inside wood slat ceiling system.
   c. Base bid will be acoustical ceiling tile and can light fixtures.
   d. See Mechanical & Electrical for further coordination.

K. Alternate No. 11: Property Appraiser Lobby 201 Ceiling:

1. Description:
   a. Provide wood panel ceiling system for PA Lobby 201 Ceiling.
   b. Provide Gypsum board ceilings for Clerks 217.
   c. Provide linear LED lighting for PA Lobby 201.
   d. Provide can lights for Clerks 217.
   e. Base bid will be acoustical ceiling tile and can light fixtures for PA Lobby 201 & Clerks 217 ceilings.
   f. See Mechanical & Electrical for further coordination.

L. Alternate No. 12: Training 406 Ceiling:

1. Description:
   a. Provide Gypsum board ceilings with wood panel ceiling system.

b. Provide linear LED lighting.
c. Base bid will be acoustical ceiling tile in lieu of wood panels and 2x4 light fixtures.
d. See Mechanical & Electrical for further coordination.

M. Alternate No. 13: Wood Door Surrounds for Hallways 101 & 102, & 401, 402:

1. Description:
a. Provide Wood Door Surround raised panel design.
b. Base bid will be no surround.

N. Alternate No. 14: Wood Door Surrounds for Hallways 152,153,154, 231, 232:

1. Description:
a. Provide Wood Door Surround raised panel design.
b. Base bid will be no surround.

O. Alternate No. 15: Emergency Generator:

1. Description:
a. Provide emergency generator for facility.
b. Base bid will be no generator.
c. Base bid will have a connection transfer switch for temporary generator connection.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1. Related Requirements:

2. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

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

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

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

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

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

a. Forms of Acceptance: Addendum
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

4. Substitutions will not be accepted no later than 15 days prior to bid date.

5. Substitutions will not be accepted after receipt of bids and/or not issued through an Addendum to the contract from the Architect.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

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

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

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Requested substitution will not adversely affect Contractor's construction schedule.
    c. Requested substitution has received necessary approvals of authorities having jurisdiction.
    d. Requested substitution is compatible with other portions of the Work.
    e. Requested substitution has been coordinated with other portions of the Work.
    f. Requested substitution provides specified warranty.
    g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on The American Institute of Architects (AIA) Document G710-2017, "*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 not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

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

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

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. Include time for review by all parties involved. Allow for a minimum 15 day review by the design team.
7. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
8. Proposal Request Form: Use form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit Price Adjustment: Refer to Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

C. Direct Owner Purchase: Refer to Division 01 Section “Direct Material Purchase Procedure” for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect direct material purchases.

1.5 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 G701-2017, ”*Change Order*”.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714-2017, “*Construction Change Directive*”. 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 01 26 00

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SECTION 01 29 00 - 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 the following:

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

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of 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. Arrange schedule of values consistent with format of The American Institute of Architects (AIA) Document G703-1992 "*Application and Certificate for Payment Continuation Sheet*".
3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. 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.

a. Differentiate between items stored on-site and items stored off-site.

5. 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.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
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: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702-1992 "*Application and Certificate for Payment*" and AIA Document G703-1992 "*Application and Certificate for Payment Continuation Sheet*" as form for Applications for Payment or Contractor's computer print-out sheet with all required data from AIA Documents G702-1992 and G703-1992 and as approved by the Owner.

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

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

E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. 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.

2. Electronic submission of the requested documents and format is acceptable.

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

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

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

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 G706-1994, "Contractor's Affidavit of Payment of Debts and Claims".
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens".
6. AIA Document G707-1994, "Consent of Surety to Final Payment".
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

J. Copies of AIA standard forms may be obtained from: The American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732

K. Copies of AIA forms are available at the architect's office for $11.99 each (at cost). The following information will need to be provided when requesting copies.

1. G702-1992 "Application and Certificate for Payment"

    a. Owner's name and legal status :
    b. Owner's address :
    c. Owner's city, state and ZIP code :
    d. Contractor's name :
    e. Contractor's address :
    f. Contractor's city, state and ZIP code :
    g. Project name :
    h. Project address or location :
    i. Architect's name and legal status :
    j. Architect's address :
    k. Architect's city, state and ZIP Code :
    l. Application number (e.g., 001) :

2. G703-1992 "Application and Certificate for Payment Continuation Sheet"

    a. Application number (e.g., 001) :

3. G706-1994, "Contractor's Affidavit of Payment of Debts and Claims"

    a. Project name :
    b. Project address or location :
    c. Owner's name :
    d. Owner's address :
    e. Owner's city, state and ZIP code :

4. G706A-1994, "Contractor's Affidavit of Release of Liens"

    a. Project name :

b. Project address or location :
c. Owner's name :
d. Owner's address :
e. Owner's city, state and ZIP code :

5. G707-1994, "Consent of Surety to Final Payment"

a. Owner's name :
b. Owner's address :
c. Owner's city, state and ZIP code :
d. Project name :
e. Project address :
f. Project city, state and ZIP Code :

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

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

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

B. Related Sections:

1. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

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

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

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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 COORDINATION DRAWINGS

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

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

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

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

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing

plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility.

1.5 REQUESTS FOR INFORMATION (RFIs)

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

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
3. Contractor shall coordinate the work with sufficient time prior to execution of the Work, so that if issuing a RFI is warranted, there will be enough time for the Architect to respond per below time frame. No excuse for a project delay on behalf of the Architect will be accepted if a quicker response time is requested.
4. It is the contractor's responsibility to maintain the schedule of construction and **shall plan ahead** in order to perform the Work in a timely manner.

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

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

C. The following form of RFI Forms shall be used for this Project:

1. The American Institute of Architects (AIA) Document G716-2004, "*Request for Information*".

a. Copies of AIA standard forms may be obtained from: The American Institute of Architects; http://www.aiacontracts.org/: email: docspurchases@aia.org; phone: (800) 942-7732
b. A Copy of this form is available at the architect's office for $11.99 (at cost). The following information will need to be provided when requesting copies.

1) Receiver's name (TO) :
2) Receiver's address :
3) Sender's name (FROM) :
4) Sender's address :
5) Sender's city, state and ZIP Code :
6) Project name :
7) Project address :
8) Project city, state and ZIP Code :

2. If Contractor has a RFI form similar to G716, acquire permission of Architect for use prior to transmittal of first RFI.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow ten (10) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

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

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

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. Use CSI Log Form 13.2B. Include the following:

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.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 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: Entity responsible for conducting meeting will 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: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

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

    a. Tentative construction schedule.
    b. Phasing.
    c. Review Site Access Plan.
    d. Critical work sequencing and long-lead items.
    e. Designation of key personnel and their duties.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Sustainable design requirements.

m. Preparation of record documents.
n. Use of the premises and existing buildings.
o. Work restrictions.
p. Working hours.
q. Owner's occupancy requirements.
r. Responsibility for temporary facilities and controls.
s. Procedures for moisture and mold control.
t. Procedures for disruptions and shutdowns.
u. Construction waste management and recycling.
v. Parking availability.
w. Office, work, and storage areas.
x. Equipment deliveries and priorities.
y. First aid.
z. Security.
aa. Progress cleaning.

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

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

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

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

w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

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

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

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

1) Review schedule for next period.

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

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of proposal requests.

15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

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

1. Contractor's construction schedule.
2. Daily construction reports.
3. Field condition reports.

1.2 INFORMATIONAL SUBMITTALS

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

1. One PDF copy to Architect.

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

C. Daily Construction Reports: Submit at weekly intervals.

D. Field Condition Reports: Submit at time of discovery of differing conditions.

1.3 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, submittal schedule, progress reports, payment requests, and other required schedules and reports.

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established 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 30 days, unless specifically allowed by Architect.

2. Identify and Indicate Activities per the project manual specification sections and order listed. Include specification numbers with each Activity.

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

4. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.

5. Startup and Testing Time: Include not less than 10 days for startup and testing.

6. 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.

7. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.

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

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 7 days of date established for the Notice to Proceed.

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

1. For construction activities that require three months or longer 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; and submit electronic copies to the Architect at weekly intervals:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Exact count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.
20. Description of area and Work performed for that day.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 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 final completion percentage for each activity.

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

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

C. Pay Application Submittal: Submit an updated Schedule with Each Pay Application per specification section 00 73 00 Supplementary Conditions.

END OF SECTION 01 32 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Sections:

1. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

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

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

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections. Submittal Schedule shall be provided to the Architect no later than 10 days after “Notice to Proceed” is issued. Failure to provide a submittal schedule prior to or with the Initial Application for Payment will delay processing payment until such a schedule is provided and at the discretion of the Architect.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings, floor plans and elevations only, will be provided upon request by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings upon request by Contractor for use in preparing Shop Drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.

B. 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.

C. Processing Time: Allow 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.

D. Paper Submittal Preparation: Place a permanent label or title block on each paper copy submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 150 by 200 mm (6 by 8 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 for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. 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., 06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 10 00.01.A).

j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.
n. Review Stamp by the General Contractor for their approval prior to submission to the Architect.

E. Electronic Submittal Preparation: Identify and incorporate information in each electronic submittal file using PDF format and as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-06 10 00.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Include the following information on an inserted cover sheet:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name of Construction Manager.
e. Name of Contractor.
f. Name of firm or entity that prepared submittal.
g. Name of subcontractor.
h. Name of supplier.
i. Name of manufacturer.
j. Number and title of appropriate Specification Section.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Related physical samples submitted directly.
n. Other necessary identification.
o. Review Stamp by the General Contractor for their approval prior to submission to the Architect.

F. Options: Identify options requiring selection by the Architect.

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

H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect or Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

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

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

K. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made.

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

1. Do not proceed with installation until an applicable copy of Product Data, Shop Drawings, Et al applicable is in the installer's possession.

2. Do not permit use of unmarked copies of Product Data in connection with construction

M. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

N. Construction Management Software:

1. The design team has no obligation to participate in an online cloud-based construction management software system.

2. When such a system is proposed to be part of the project’s management procedures for submittals, the General Contractor shall arrange the submittal review process to reflect the Architect’s Action Stamp.

3. If failure to arrange and match the online system with the review language of the Architect's Action Stamp, the design team is not required to participate in such an online system. General Contractor will make other means to provide electronic submittals for the design team's review per above sections in this specification.

4. Any or all the design team has the choice to opt out such a system at any time. General Contractor will make other means to provide electronic submittals for those design professionals who elect nonparticipation.

5. Architect's consultants shall be arranged in the Workflow pattern ahead of the architect. The architect shall be included in all submittals as part of the review process. At no time shall the Architect's consultants be contacted through such a system without notifying the architect first. Architect is to be copied at all phases of the workflows.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Action Submittals: Submit Adobe Acrobat Portable Document Format via email or a file transfer service.
2. Informational Submittals: Submit Adobe Acrobat Portable Document Format via email or a file transfer service.
3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

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

5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

6. Contractor shall submit all required/requested documents per each specification section at **ONE** time. Incomplete and/or Partial submittals, at the Architect's discretion, will be returned "NO ACTION" and contractor shall resubmit once all information is provided.

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

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

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

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

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

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

    a. Adobe Acrobat Portable Document Format via email or a file transfer service.

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

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

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

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 215 by 280 mm (8-1/2 by 11 inches) but no larger than 600 by 900 mm (24 by 36 inches).

3. Submit Shop Drawings in the following format:

a. Adobe Acrobat Portable Document Format via email or a file transfer service.

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

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

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Compliance with recognized standards.
   f. Availability and delivery time.

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.

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

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 one 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 two sets of Samples. Architect will retain one Sample set; remainder will be returned.

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

E. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. 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. Use CSI Form 1.5A.

1. Submit subcontract list in the following format:

a. Number of Copies: Two paper copies of subcontractor list, unless otherwise indicated. Architect will return one copy.

I. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

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

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

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

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

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

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

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

Q. Product Test Reports: Submit 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.

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

S. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

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

U. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

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

2.2 DELEGATED-DESIGN SERVICES

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

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

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

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp from the General Contractor. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of General Contractor's approval, and the statement "We certify that this submittal has been reviewed, checked, and approved for compliance with the Contract Documents". The term "approved" must be included in the Approval Stamp.

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 Stamp: Each submittal will be stamped with a uniform action stamp. The stamp shall be marked to indicate one of the following actions taken:

1. Final Unrestricted Release: Where marked "No Exceptions Taken", the work covered by the submittal may proceed, provided it complies with the requirements of the Contract Documents.

2. Final But Restricted Release: Where marked "Furnish Per Comments", the work covered by the submittal may proceed, provided it complies with the notations or corrections on the submittal and with the requirements of the Contract Documents.

3. Return for Resubmittal: Where marked "Revise and Resubmit", do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery or any other activity. Revise or prepare a new submittal according to the notations on the submittal or on the return transmittal. Resubmit without delay, repeating as necessary to obtain a final release action mark.

4. Return for "REJECTED" where marked, no work shall be fabricated, manufactured and/or constructed. The Contractor shall prepare a new submittal to the contracting officer or the contracting officer's authorized representative for a product that complies with the contract documents.

5. “No Action”: Where a submittal is for the record or for information or for another purpose not requiring review action, the submittal may not be returned or may be returned and marked "Action Not Required."

6. “For Record Only”: This where a submittal is reviewed by the Architect’s consultant and the Architect elects to let the consultant’s review govern with deferment to the consultant with no action from the Architect. At no point does this action override the consultant’s review.

C. 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 per above.

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

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

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

G. Submittals provided that are Substitutions without following the substitution procedures and approved by the Architect will return them **without action**. See specification section “01 25 00 – Substitution Procedures” for further direction.

3.3 REPETITIVE REVIEW

A. Need for resubmission of shop drawings, product data and samples submitted or delay in obtaining Architect’s review of Submittals, shall not entitle Contractor to an extension of Contract Time nor increase Contract Price, nor shall it become the basis for a “Damages for Delay” claim.

3.4 COLOR AND FINISHES

A. Architect will prepare a master color schedule indicating required color, finish, pattern, material, texture, and other pertinent information in connection with interior and exterior finishes.

B. To facilitate preparation of such schedule, Contractor shall submit, within 45 calendar days following Notice of Award, unless otherwise extended by Architect, names of manufactures whose products Contractor proposes to use within framework of Specifications, whenever color, finish pattern, texture, or other related information is a consideration, e.g., paint, ceramic tile, resilient flooring, acoustical ceiling tile, toilet partitions, and other items for which the above properties affect design.

C. Submit color chips for all items having color unless otherwise directed or approved by Architect. Upon expiration of such 45 day period, Architect will proceed with color selection and preparation of final color schedule. Submit color chips for all items having color unless otherwise directed or approved by Architect. Upon expiration of such 45 day period, Architect will proceed with color selection and preparation of final color schedule.

D. Architect will select colors and finishes of a manufacturer within framework of Specifications, for each item where Contractor fails to submit name of a specific manufacturer within allotted time, and Contractor provide such materials without additional compensation.

END OF SECTION 01 33 00

SECTION 01 33 10 - WEATHER TABLE

PART 1 - GENERAL

1.1 INFORMATION AND DATA

A. A.Information and data furnished or referred to in the weather table is furnished for the Contractor's information.

1.2 CONTRACT TIME LIMITS

A. A.The contract time limits include weather conditions that are shown in the table listed herein.

1.3 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

A. This provision specifies the procedure for the determination of time extensions for unusually severe weather affecting exterior work in accordance with the Contract. The following listing defines the monthly anticipated adverse weather for the contract period and is based on NOAA data (https://www.weather.gov/wrh/climate) 'General Climate Summary Tables – Precipitation' for the geographic location of the project.

MONTHLY ANTICIPATED ADVERSE WEATHER CALENDAR DAYS

Crestview, Florida

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
1	1	1	1	1	1	2	2	1	1	1	1

This listing of anticipated adverse weather will constitute the base line monthly weather time evaluations. Throughout the contract each month, actual adverse weather days will be recorded on a calendar basis (including weekends and holidays) and compared to the monthly anticipated adverse weather in this listing. The term "actual adverse weather days" shall include days impacted by actual adverse weather. The number of actual adverse weather days affecting exterior work shall be calculated chronologically from the first to the last day in each month. Adverse weather days must prevent work for 50 percent or more of the contractor's workday and delay work critical to the timely completion of the project. If the number of actual adverse weather days exceeds the number of days anticipated in the above listing, then the Architect will determine the time extension for the Contractor for any such days that exceed the monthly baseline only provided that any such day exceeding the baseline impacts a planned work day for the Contractor (as opposed to a non-working weekend or holiday). The Architect will convert any qualifying delays to calendar days and issue a modification in accordance with the contract.

1.4 ADVERSE WEATHER AND WEATHER DELAY DAYS

A. Adverse Weather is defined as the occurrence of one or more of the following conditions which prevents exterior construction activity or access to the site within twenty-four (24) hours:

1. Precipitation (rain, snow, or ice) in excess of one-half inch (0.5") liquid measure.
2. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
3. Sustained wind in excess of twenty-five (25) m.p.h.

B. Adverse Weather may include, if appropriate, "dry-out" or "mud" days

1. resulting from precipitation days that occur beyond the standard baseline;
2. only if there is a hindrance to site access or sitework such as excavation, backfill, and footings and Contractor has taken all reasonable accommodations to avoid such hindrance; and
3. at a rate no greater than one (1) make-up day for each day or consecutive days of precipitation beyond the standard baseline that total 1.0 inch or more, liquid measure, unless specifically recommended otherwise by the Designer.

C. A Weather Delay Day may be counted if adverse weather prevents work on the project for fifty percent (50%) or more of the contractor's scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday if Contractor has scheduled construction activity that day.

D. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that "dry-out" or "mud" days are not eligible to be counted as Weather Delay Day until the standard baseline is exceeded. Hence, Contractor should allow for an appropriate number of additional days associated with the Standard Baseline days in which such applicable construction activities are expected to be prevented and suspended.

1.5 TIME EXTENSIONS

A. Time extensions for weather may be granted for weather in excess of normal that impacts ongoing activities on the site that have successive following activities that must be completed in a required sequence for completion of project within the specified performance period. These would be generally labeled as Critical Path Activities when that type of schedule is used.

B. Any request for a time extension for weather must include:

1. Weather data from National Weather Services demonstrating impact above baseline set forth in §1.03, above.
2. Impact on ongoing critical path activities.
3. Relation of those activities to completion of the project.

C. Request for time extensions as indicated above must be made within 30 days of the period of excessive weather. A submission of weather events on Monthly basis is acceptable per below. No time extensions will be granted for weather if not requested within 45 days as indicated above.

D. Time extensions for weather may be granted for weather in excess of normal that impacts ongoing activities on the site that have successive following activities that must be completed in a required sequence for completion of project within the specified performance period. These would be generally labeled as Critical Path Activities when that type of schedule is used

E. With each pay application, the Contractor shall provide a letter on the Contractor's letterhead to the Architect indicating the number of weather days and of days impacted due to the weather in excess of the baseline for that pay period and for the Project as a whole. If no weather days occurred, the contractor shall indicate 0 (zero) days.

END OF SECTION 01 33 10

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

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

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

C. Related Sections:

1. 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 constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

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

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

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

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

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

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

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

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

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

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

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

1.4 INFORMATIONAL SUBMITTALS

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

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

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

1.5 REPORTS AND DOCUMENTS

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

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

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

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

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents,

established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

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

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

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

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

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

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

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   d. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven (7) 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.

   a. Allow seven (7) days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 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 manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect 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. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.
7. Coordinate and provide access for exterior envelope consultant to observe factory testing as requested by the consultant.

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 or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

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SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": 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.

J. The terms “Owner” and “City” have the same meaning and can be used interchangeably.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

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

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)

AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)

AWCI	Association of the Wall and Ceiling Industry
AWCMA	American Window Covering Manufacturers Association (Now WCMA)
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association)
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI, Inc.
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
BWF	Badminton World Federation (Formerly: IBF - International Badminton Federation)
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CEA	Consumer Electronics Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute

CRRC	Cool Roof Rating Council
CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet and Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association (Electrostatic Discharge Association)
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals LLC
FM Global	FM Global (Formerly: FMG - FM Global)

FMRC	Factory Mutual Research (Now FM Global)
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation (Now BWF)
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council

IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization Available from ANSI
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA (Now ETL SEMCO)
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association

NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NOMMA	National Ornamental & Miscellaneous Metals Association
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)

NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc. (Now TCNA)
TCNA	Tile Council of North America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.
WASTEC	Waste Equipment Technology Association

WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

IAPMO	International Association of Plumbing and Mechanical Officials
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers
CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency

FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
LBL	Lawrence Berkeley National Laboratory
NCHRP	National Cooperative Highway Research Program (See TRB)
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration
PBS	Public Buildings Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USDA	Department of Agriculture
USPS	Postal Service

E. 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. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up to date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board
CFR	Code of Federal Regulations Available from Government Printing Office

DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point
DSCC	Defense Supply Center Columbus (See FS)
FED-STD	Federal Standard (See FS)
FS	Federal Specification Available from Department of Defense Single Stock Point
	Available from Defense Standardization Program
	Available from General Services Administration
	Available from National Institute of Building Sciences
FTMS	Federal Test Method Standard (See FS)
MIL	(See MILSPEC)
MIL-STD	(See MILSPEC)
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point
UFAS	Uniform Federal Accessibility Standards Available from Access Board

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

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SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1. Related Section:

a. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

b. Division 00 Section "Supplementary Conditions" for additional site requirements.

1.2 USE CHARGES

A. Water and Sewer Service from Existing System: Provide connections and extensions of services as required for construction operations.

B. Electric Power Service from Existing System: Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

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

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 50-mm (2-inch), 3.8-mm- (0.148-inch-) thick, galvanized steel, chain-link fabric fencing; minimum 1.8 m (6 feet) high with galvanized steel pipe posts; minimum 60-mm- (2-3/8-inch-) OD line posts and 73-mm- (2-7/8-inch-) OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 50-mm (2-inch), 3.8-mm- (0.148-inch-) thick, galvanized steel, chain-link fabric fencing; minimum 1.8 m (6 feet) high with galvanized steel pipe posts; minimum 60-mm- (2-3/8-inch-) OD line posts and 73-mm- (2-7/8-inch-) OD corner and pull posts, with 42-mm- (1-5/8-inch-) OD top and bottom rails. Provide concrete bases for supporting posts.

C. Wood Enclosure Fence: Plywood, 1.8 m (6 feet) high, framed with four 50-by-100-mm (2-by-4-inch) rails, with preservative-treated wood posts spaced not more than 2.4 m (8 feet) apart.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Field Office shall be on site within **30 days after Notice to Proceed** and Site Access plan has been reviewed by Architect. See specification section “00 73 00 Supplementary Conditions” for use of site for additional requirements.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. 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 and clean HVAC system as required in Division 01 Section "Closeout Procedures."

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.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

H. 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.

I. 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.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 9 m (30 feet) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. 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.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. 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.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

G. 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.

H. 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.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Stormwater Control: Comply with requirements of 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 and after Rough Grading of Site, 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. Furnish one set of keys to Owner.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting. Contractor is responsible to provide adequate traffic control and monitored access as necessary to protect the public from construction activities.

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 temporary fire-rated closures as necessary per below:

1. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.

2. Insulate partitions to control noise transmission to occupied areas.
3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 57 23 - TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Temporary stormwater pollution controls.

1.3 STORMWATER POLLUTION PREVENTION PLAN

A. The Stormwater Pollution Prevention Plan (SWPPP) is part of the Contract Documents and is bound into this Project Manual.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, and earthwork subcontractor.
2. Review requirements of the SWPPP, including permitting process, worker training, and inspection and maintenance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Stormwater Pollution Prevention Plan (SWPP): Within 15 days of date established for commencement of the Work, submit completed SWPPP.

B. EPA authorization under the EPA's "2017 Construction General Permit (CGP)."

C. Stormwater Pollution Prevention (SWPP) Training Log: For each individual performing Work under the SWPPP.

D. Inspection reports.

1.6 QUALITY ASSURANCE

A. Stormwater Pollution Prevention Plan (SWPPP) Coordinator: Experienced individual or firm with a record of successful water pollution control management coordination of projects with similar requirements.

1. SWPPP Coordinator shall complete and finalize the SWPPP form.
2. SWPPP Coordinator shall be responsible for inspections and maintaining of all requirements of the SWPPP.

B. Installers: Trained as indicated in the SWPPP.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

A. Provide temporary stormwater pollution controls as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.

B. Locate stormwater pollution controls in accordance with the SWPPP.

C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.

1. Inspect, repair, and maintain SWPPP controls during construction.

a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.

D. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

END OF SECTION 01 57 23

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Section:

1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

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

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed

comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in 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, select product 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 and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

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

C. Storage:

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

6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

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

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. 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, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:

   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will no] be considered.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Sections:

1. Division 00 Section “General Conditions’ and Section “Supplementary Conditions” for requirements and responsibilities of the General Contractor for execution of the Work.

2. 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 QUALITY ASSURANCE.

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

a. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that

results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.3 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, utilize products for patching that comply with requirements of Division 01 Section "Sustainable Design Requirements."

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. 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. 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.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

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

B. General: 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.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

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.

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. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately

located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
2. No exterior concrete or asphalt paving will be cut for any reason without the expressed written permission of the School District. Directional boring is to be utilized when practical to do so.

B. Temporary Support: Provide temporary support of work to be cut.

C. 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.

D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. 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 prevent interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable 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.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: **Clean Project site and work areas daily, including common areas.** Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven (7) days during normal weather or three (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: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

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

3.10 CORRECTION OF THE WORK

A. See Section 00 72 00 - General Conditions and Section 00 73 00 - Supplementary Conditions for requirements and responsibilities.

B. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

G. All corrective work shall be the responsibility of the General Contractor.

END OF SECTION 01 73 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Sections:

1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
3. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
4. 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 with request.

1. **General Contractor 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. See below for requirements.
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 photographic documentation, 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 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. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

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.
3. Submit list of incomplete items in the following format:

    a. One (1) electronic copy, unless otherwise indicated.

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 215-by-280-mm (8-1/2-by-11-inch) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a 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 other required labels and identification, including mechanical and electrical nameplates.

    l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
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.

END OF SECTION 01 77 00

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SECTION 01 78 23 - 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, and 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 Substantial Completion**. Architect will return copy with comments within 15 days after Substantial Completion.

1. Correct or modify each manual to comply with Architect's comments. Submit Two 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 215-by-280-mm (8-1/2-by-11-inch) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. 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.

5. Submission of manuals in an electronic format mediums is acceptable alternative. When submitting electronically, provide all requested information including As-built Documents in CDs or Thumb drives format in a binder for a physical transmission. Label each item with its contents.

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, water leak, power failure and equipment failure.

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 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 01 78 23

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SECTION 01 78 39 - 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.

D. It is the General Contractor's responsibility to provide the below information. The design team will not be updating construction documents for the as-built condition unless noted elsewhere.

E. Electronic submission is acceptable if provided on physical data transfer formats.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one(1) set(s) of marked-up Record Prints.

2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one(1) set of marked-up Record Prints. Architect will review for completeness.
b. Final Submittal: Submit one (1) final set of marked-up Record Prints.

B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one (1) copy of each Product Data submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one (1) 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.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders 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 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 (1) 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 01 78 39

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SECTION 01 79 00 - 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.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

B. Training Modules: 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. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. 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 with at least seven days' advance notice.

END OF SECTION 01 79 00

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control. Indicate proposed locations and construction of barriers.

C. Schedule of selective demolition activities with starting and ending dates for each activity.

D. Predemolition photographs or video.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off utilities with utility companies.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least two hours after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

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SECTION 03 05 55 – CONCRETE WATER VAPOR REDUCING ADMIXTURE

1.01 SUMMARY

A. ***Section Includes:*** Furnishing of all labor, materials, services and equipment necessary for the supply and installation of waterproofing additive to concrete as indicated on the drawings and as specified herein.

B. ***Related Sections:***

1. 03 11 00 CONCRETE FORMING
2. 03 20 00 CONCRETE REINFORCEMENT
3. 03 25 00 CONCRETE ACCESSORIES
4. 03 30 00 CAST-IN-PLACE CONCRETE
5. 03 90 00 CONCRETE TESTING
6. 07 90 00 Joint Protection

1.02 REFERENCES

A. ***Applicable Standards:*** The following standards are referenced herein.

1. American Society for Testing and Materials (ASTM)
2. Army Corps of Engineers (CRD)
3. American Concrete Institute (ACI)
4. American National Standards Institute (ANSI)
5. NSF International
6. Drinking Water Inspectorate (DWI)

1.03 SYSTEM DESCRIPTION

A. ***Waterproofing Additive:*** This crystalline system causes the concrete to become sealed against the penetration of liquids from any direction, and protects the concrete from deterioration due to harsh environmental conditions. The system is used for above or below-grade walls and slabs, including liquid retaining structures and where enhanced chemical resistance is required.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. ***Testing Requirements:*** Water Vapor Reducing Admixture (WVRA) shall have been be tested in accordance with the following standards and conditions, and the testing results shall meet or exceed the performance requirements as specified herein.

B. ***Independent Laboratory:*** Testing shall have been performed by an accredited independent laboratory meeting the requirements of ASTM E 329 and AASHTO or other applicable international standard for certification of testing laboratories. Testing laboratory shall have obtain all control and treated concrete samples.

C. ***Crystalline Formation:*** Capability of waterproofing system shall be evidenced by independent SEM (Scanning Electron Microscope) photographs showing lack of continuous pore capillaries within the concrete matrix.

D. ***Permeability 1:*** Independent testing shall be performed according to a U.S. Army Corps of Engineers CRD-C48 (Mod.) "Permeability of Concrete". Concrete samples shall be pressure tested to 150 psi (350 foot head of water) or 1.05 MPa (106 m head of water). The results shall show a total change in volume of water less than 100 cm3

E. ***Compressive Strength:*** Concrete samples containing the WVRA shall be tested against an untreated control sample of the same mix. At 28 days, the treated samples shall exhibit equal or increased compressive strength over the control sample.

F. ***Potable Water Approval:*** Waterproof material shall have a current, valid approval certificate from NSF (NSF 61), DWI, or other recognized certification agency.

1.05 SUBMITTALS

A. ***General:*** Submit listed submittals in accordance with conditions of the Contract and with Division 1 Submittal Procedures Section.

B. ***Product Data:*** Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for waterproofing applications.

C. ***Test Reports:*** Submit, for acceptance, complete test reports from approved independent testing laboratories certifying that waterproofing system conforms to performance characteristics and testing requirements specified herein.

D. ***Manufacturer's Certification:*** Provide document signed by manufacturer or manufacturer's representative certifying that the materials to be installed comply with the requirements of this specification.

1.06 QUALITY ASSURANCE

A. ***Manufacturer Qualifications:*** To have no less than 10 years experience in manufacturing the WVRA for the required work. Manufacturer must be capable of providing field service representation during construction phase. Manufacturers who cannot provide ongoing field support or who cannot provide the performance test data specified herein will not be considered for the project.

B. ***Installer:*** Ready-mix supplier and/or installer of WVRA shall be approved by the manufacturer or manufacturer's representative in writing.

C. ***Pre-Installation Conference:*** Prior to installation of waterproofing system, conduct meeting with Architect/Engineer, owner's representative, concrete supplier, concrete placer and waterproofing manufacturer's representative to verify and review the following:

1. Project requirements for waterproofing as set out in Contract Documents.

2. Manufacturer's product data including mixing and installation instructions.

D. ***Technical Consultation:*** The waterproofing manufacturer's representative shall provide technical consultation on waterproofing applications and shall provide on-site support as needed.

1.07 DELIVERY, STORAGE AND HANDLING

A. ***Ordering:*** Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. ***Delivery:*** Deliver packaged waterproofing materials to project site in original undamaged containers, with manufacturer's labels and seals intact.

C. ***Storage:*** Store waterproofing materials in dry, enclosed location, at a minimum temperature of 45 °F (7 °C). .

D. ***Handling:*** The WVRA supplier shall provide equipment to place the WVRA in the truck and it must be represented on the batch ticket from the ready mix provider.

1.08 WARRANTY

A. ***Project Warranty:*** Refer to conditions of the Contract for project warranty provisions.

B. ***Manufacturer's Warranty:*** Manufacturer shall provide standard product warranty executed by authorized company official.

PART 2 – PRODUCTS

2.01 MATERIALS

A. ***Acceptable Manufacturer:***
Specialty Products Group, Inc.
6254 Skyway Road, Smithville, Ontario, Canada L0R 2A0
Tel: 877.957.4626 Fax: 905.527.0606
Email: info@spggogreen.com Website: spgGoGreen.com

B. Basis of Design***:*** Vapor Lock Water Vapor Reducing Admixture
1. Vapor Lock 20/21 Water Proofing, Shrink Reduction and Internal Wet Curing Admixture

C. ***Substitutions:*** Per Division One procedures.

2.02 DOSAGE

A. ***General:*** Vapor Lock WVRA must be added to concrete mix at time of batching and must be on the printed batch ticket.

B. ***Dosage Rate:*** Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at the following rates:

1. Vapor Lock 20/21 added at 10 ounces per hundred weight of cementitious materials.

Note: For enhanced chemical protection or for meeting specific project requirements or where the concrete mix design contains higher than 25% type F fly ash content or includes a Portland cement/slag cement/type C fly ash blend, consult with manufacturer or its authorized representative to determine appropriate dosage rates.

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. ***Compliance:*** Comply with manufacturer's product data regarding installation, including technical bulletins, product catalogue, installation instructions and product packaging labels.

3.02 PROJECT CONDITIONS

A. ***Crack Control:*** All reinforcement shall be in accordance with applicable standards. Concrete elements shall be designed and constructed to minimize and control cracking.

B. ***Setting Time and Strength:*** There will be no set delay with a Vapor Lock WVRA. Conduct trial mixes under project conditions to determine setting time and strength of the concrete. Consult with manufacturer or manufacturer's representative regarding concrete mix design, project conditions and proper dosage rate.

C. ***Weather Conditions:*** For mixing, transporting and placing concrete under conditions of high temperature or low temperature, follow concrete practices such as those referred to in ACI 305R (Hot Weather Concreting) and ACI 306R (Cold Weather Concreting) or other applicable standards.

3.03 APPLICATION

A. ***General:*** The Vapor Lock WVRA needs to added into the mix water at the time of batching. The Ready Mix provider must be certified for the use of Vapor Lock WVRA.

Note 2: Consult with local Vapor Lock WVRA Services Representative concerning additional procedures for addition and mixing.

B. ***Repair of Defects:*** Concrete defects shall be repaired in accordance with manufacturer's technical literature including relevant Method Statements (spggogreen.com).

3.04 Placing

A. ***Concrete Placement:*** Concrete placement shall be in accordance with "309R: Guide for Consolidation of Concrete" or other applicable standard. Special attention is to be given to consolidation at joints, penetrations and other potential leakage locations.

3.05 CURING

A. ***General:*** Concrete containing Vapor Lock WVRA shall be moist cured in accordance with ACI 308, "Standard Practice for Curing Concrete" or other applicable standard.

B. ***Curing Compounds:*** Curing compounds may be used in the event that project requirements or conditions prevent moist curing. Curing compounds shall comply with ASTM C-309 or other applicable standard.

3.06 PROTECTION

A. ***Protection:*** Protect installed product and finished surfaces from damage during construction.

3.07 FIELD QUALITY CONTROL

A. A Technical Representative from Vapor Lock WVRA shall be on site during placement.

3.08 INTERACTION WITH OTHER MATERIALS

A. ***Backfilling:*** Normal backfilling procedures may be used after concrete has been cured.

B. ***Paint, Epoxy, Grout, Cement Parge Coat, Plaster or Stucco:***Vapor Lock WVRA will not interfere with bonding of coatings and in many cases will supply a Warranty. Follow surface preparation and other relevant directions of the coating or parge material manufacturer.

C. ***Responsibility to Ensure Compatibility:*** Vapor Lock WVRA is compatible with all admixtures. A Vapor Lock WVRA Technical representative will approve the mix design on a project specific basis.

END OF SECTION 03 05 55

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

SUMMARY

Section Includes:

Form-facing material for cast-in-place concrete.
Form liners.
Shoring, bracing, and anchoring.

Related Requirements:

Section 321313 "Concrete Paving" for formwork related to concrete pavement and walks.

DEFINITIONS

Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

PREINSTALLATION MEETINGS

Preinstallation Conference: Conduct conference at Project site.

Review the following:

Special inspection and testing and inspecting agency procedures for field quality control.
Construction, movement, contraction, and isolation joints
Forms and form-removal limitations.
Shoring and reshoring procedures.
Anchor rod and anchorage device installation tolerances.

ACTION SUBMITTALS

Product Data: For each of the following:

Exposed surface form-facing material.

Concealed surface form-facing material.
Forms for cylindrical columns.
Void forms.
Form liners.
Form ties.
Waterstops.
Form-release agent.

Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

For exposed vertical concrete walls, indicate dimensions and form tie locations.
Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301 (ACI 301M).

Location of construction joints is subject to approval of the Architect.

Indicate location of waterstops.
Indicate form liner layout and form line termination details.
Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
Indicate layout of insulating concrete forms, dimensions, course heights, form types, and details.

Samples:

For waterstops.
For Form Liners: 12-inch by 12-inch (305-mm by 305-mm) sample, indicating texture.

INFORMATIONAL SUBMITTALS

Qualification Data: For testing and inspection agency.

Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC353.

Field quality-control reports.

Minutes of preinstallation conference.

QUALITY ASSURANCE

Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

Mockups: Formed surfaces to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.

Build panel approximately 100 sq. ft. (9.3 sq. m) in the location indicated or, if not indicated, as directed by Architect.
Subject to compliance with requirements, approved mockups may become part of the completed Work.

DELIVERY, STORAGE, AND HANDLING

Form Liners: Store form liners under cover to protect from sunlight.

Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS

Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

For architectural concrete specified in Section 033300 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).

FORM-FACING MATERIALS

As-Cast Surface Form-Facing Material:

Provide continuous, true, and smooth concrete surfaces.
Furnish in largest practicable sizes to minimize number of joints.
Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:

Plywood, metal, or other approved panel materials.
Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

APA HDO (high-density overlay).
APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
APA Plyform Class I, B-B or better; mill oiled and edge sealed.

Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

Provide lumber dressed on at least two edges and one side for tight fit.

Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces without spiral or vertical seams not exceeding specified formwork surface class.

Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

WATERSTOPS

Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.
Profile: Ribbed with center bulb.
Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.8 mm thick); nontapered.

RELATED MATERIALS.

Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

Formulate form-release agent with rust inhibitor for steel form-facing materials.
Form release agent for form liners shall be acceptable to form liner manufacturer.

Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

INSTALLATION OF FORMWORK

Comply with ACI 301 (ACI 301M).

Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M) and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.

Limit concrete surface irregularities as follows:
Surface Finish-3.0: ACI 117 Class A, 1/8 inch (3.0 mm).

Construct forms tight enough to prevent loss of concrete mortar.

Minimize joints.
Exposed Concrete: Symmetrically align joints in forms.

Construct removable forms for easy removal without hammering or prying against concrete surfaces.

Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
Install keyways, reglets, recesses, and other accessories, for easy removal.

Do not use rust-stained, steel, form-facing material.

Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

Provide and secure units to support screed strips
Use strike-off templates or compacting-type screeds.

Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
Locate temporary openings in forms at inconspicuous locations.

Chamfer exterior corners and edges of permanently exposed concrete.

At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).

Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

Determine sizes and locations from trades providing such items.
Obtain written approval of Architect prior to forming openings not indicated on Drawings.

Construction and Movement Joints:

Construct joints true to line with faces perpendicular to surface plane of concrete.
Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
Place joints perpendicular to main reinforcement.
Locate joints for beams, slabs, joists, and girders in the middle third of spans.

Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
Space vertical joints in walls as indicated on Drawings.

Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

INSTALLATION OF EMBEDDED ITEMS

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.
Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
Install dovetail anchor slots in concrete structures, as indicated on Drawings.
Clean embedded items immediately prior to concrete placement.

INSTALLATION OF WATERSTOPS

Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.

Install in longest lengths practicable.
Locate waterstops in center of joint unless otherwise indicated on Drawings.
Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
Secure waterstops in correct position at 12 inches (305 mm) on center.
Field fabricate joints in accordance with manufacturer's instructions using heat welding.

Miter corners, intersections, and directional changes in waterstops.
Align center bulbs.

Clean waterstops immediately prior to placement of concrete.
Support and protect exposed waterstops during progress of the Work.

REMOVING AND REUSING FORMS

Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

Clean and repair surfaces of forms to be reused in the Work.

Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
Apply new form-release agent.

When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

Align and secure joints to avoid offsets.
Do not use patched forms for exposed concrete surfaces unless approved by Architect.

SHORING AND RESHORING INSTALLATION

Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.

Do not remove shoring or reshoring until measurement of slab tolerances is complete.

In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

FIELD QUALITY CONTROL

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

Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

Inspections:

Inspect formwork for shape, location, and dimensions of the concrete member being formed.
Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 03 10 00

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

B. Related Requirements:

1. Section 033816 "Unbonded Post-Tensioned Concrete" for reinforcing related to post-tensioned concrete.
2. Section 034500 "Precast Architectural Concrete" for reinforcing used in precast architectural concrete.
3. Section 321313 "Concrete Paving" for reinforcing related to concrete pavement and walks.
4. Section 321316 "Decorative Concrete Paving" for reinforcing related to decorative concrete pavement and walks.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction contraction and isolation joints.
c. Steel-reinforcement installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Zinc repair material.
4. Bar supports.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of

mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For delegated design engineer and testing and inspection agency.

B. Delegated Design Engineer Qualifications: Include the following:

1. Experience providing delegated design engineering services of the type indicated.
2. Documentation that delegated design engineer is licensed in the state in which Project is located.

C. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:

a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

C. Mockups: Reinforcing for cast-concrete formed surfaces, to demonstrate tolerances and standard of workmanship.

1. Build panel approximately 100 sq. ft. (9.3 sq. m) for formed surface in the location indicated on Drawings or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

C. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.

1. Finish: Plain.

D. Zinc Repair Material: ASTM A780/A780M.

2.3 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
2. Stagger splices in accordance with ACI 318 (ACI 318M).
3. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

    a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches (305 mm).

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

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

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement welding.

END OF SECTION 03 20 00

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 03 05 55 "Concrete Water Vapor Reducing Admixture" for waterproofing additive to concrete .
2. Section 03 10 00 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
3. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
4. Section 07 26 13 "Under-slab Vapor Barrier" for Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.
5. Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-ground.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.

c. Semirigid joint fillers.
d. Vapor-retarder installation.
e. Anchor rod and anchorage device installation tolerances.
f. Cold and hot weather concreting procedures.
g. Concrete finishes and finishing.
h. Curing procedures.
i. Forms and form-removal limitations.
j. Shoring and reshoring procedures.
k. Methods for achieving specified floor and slab flatness and levelness.
l. Floor and slab flatness and levelness measurements.
m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
p. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement
7. Aggregates.
8. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

9. Color pigments.
10. Fiber reinforcement.
11. Vapor retarders.
12. Floor and slab treatments.
13. Liquid floor treatments.
14. Curing materials.
15. Finishing Aids

    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.

16. Joint fillers.
17. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.

4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

a. Location of construction joints is subject to approval of the Architect.

D. Samples: For vapor retarder.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.
4. Curing compounds.
5. Floor and slab treatments.

6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

E. Mockups: Cast concrete formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Formed Surfaces: Build panel approximately 100 sq. ft. (9.3 sq. m) in the location indicated or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

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

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.
f. Permeability.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
5. 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 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I Type II Type I/II, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).

2. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete. ASTM C494/C494M, Meets ASTM C1582.

9. Pozzolanic Admixture: ASTM C494 Type S. Colloidal nano-silica.

10. Internal Curing Admixture: ASTM C494 Type S. Colloidal nano-silica.

11. Permeability-Reducing Admixture: ASTM C494/C494M, Type S, hydrophilic, permeability-reducing crystalline admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure (PRAH).
    a. Permeability: No leakage when tested in accordance with U.S. Army Corps of Engineers CRD C48 at a hydraulic pressure of 200 psi (1.28 MPa) for 14 days.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water-vapor permeance of .01 perms; not less than 15 mils (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.4 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. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F (10 deg C): Black.
b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
c. Ambient Temperature Above 85 deg F (29 deg C): White.

D. Curing Paper: 8-feet- (2438-mm-) wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable or complying with ASTM C1602/C1602M.

F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

K. Internal Curing Admixture

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Floor Slab Protective Covering: 8-feet- (2438-mm-) wide cellulose fabric.

2.6 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 Mpa) at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

2.7 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
6. Pozzolanic Admixture: Replace up to 15% percent of cement by mass with colloidal nano-silica.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, concrete for parking structure slabs, and concrete with a w/cm below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.
6. Use internal-curing admixture in concrete where indicated.
7. Use pozzolanic admixture in concrete where indicated.

D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 (ACI 318M) F0 S0 W1 C2.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Air Content: N/A

5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

B. Class B: Normal-weight concrete used for walls, beams, columns, and slabs.

1. Exposure Class: ACI 318 (ACI 318M) F2 S0 W1 C2.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Air Content:
   a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.0 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.

5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement in non-prestressed concrete. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement in prestressed concrete.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: 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.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
b. Remove projections larger than 1 inch (25 mm).
c. Tie holes do not require patching.
d. Surface Tolerance: ACI 117 (ACI 117M) Class D.
e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
    b. Remove projections larger than 1/4 inch (6 m
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 (ACI 117M) Class B.
    e. Locations: Apply to concrete surfaces to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

3. ACI 301 (ACI 301M) Surface Finish SF-3.0:

    a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
    b. Remove projections larger than 1/8 inch (3 mm).
    c. Patch tie holes.
    d. Surface Tolerance: ACI 117 (ACI 117M) Class A.
    e. Locations: Apply to concrete surfaces exposed to public view,.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

    a. Perform no later than one day after form removal.
    b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
    d. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.

2. Grout-Cleaned Rubbed Finish:

    a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    b. Do not clean concrete surfaces as Work progresses.
    c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    d. Wet concrete surfaces.
    e. 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.
    f. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.

3. Cork-Floated Finish:

    a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.

b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
c. Wet concrete surfaces.
d. Compress grout into voids by grinding surface.
e. In a swirling motion, finish surface with a cork float.
f. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.

4. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi (6.9 to 10.3 MPa), apply scrubbed finish.

a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed, and aggregate is uniformly exposed.
b. Rinse scrubbed surfaces with clean water.
c. Maintain continuity of finish on each surface or area of Work.
d. Remove only enough concrete mortar from surfaces to match design reference sample or mockups.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3 mm).
        2) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15.
        3) Specified overall values of flatness, F_F 35; and of levelness, F_L 25; with minimum local values of flatness, F_F 24; and of levelness, F_L 17.
        4) Specified overall values of flatness, F_F 45; and of levelness, F_L 35; with minimum local values of flatness, F_F 30; and of levelness, F_L 24.
        5) Specified overall values of flatness, F_F 50; and of levelness, F_L 25; with minimum local values of flatness, F_F 40; and of levelness, F_L 17.

    b. Suspended Slabs:

        1) 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 1/8 inch (3 mm).
        2) Specified overall values of flatness, F_F 25; and of levelness, F_L 20; with minimum local values of flatness, F_F 17; and of levelness, F_L 15.
        3) Specified overall values of flatness, F_F 35; and of levelness, F_L 20; with minimum local values of flatness, F_F 24; and of levelness, F_L 15.
        4) Specified overall values of flatness, F_F 45; and of levelness, F_L 35; with minimum local values of flatness, F_F 30; and of levelness, F_L 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

a. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications.
b. Tamp aggregate flush with surface, but do not force below surface.
c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches (150 mm) high unless otherwise indicated on Drawings, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
b. Cast anchor-bolt insert into bases.
c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1, before and during finishing operations.
4. Use internal curing admixture as the curing method where indicated.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

    a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

   a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
   b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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 (300 mm), and sealed by waterproof tape or adhesive.

   a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

   a) Water.
   b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

   a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
   b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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 (300 mm), and sealed by waterproof tape or adhesive.

   a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

   a) Water.
   b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

d. Floors to Receive Chemical Stain:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
3) Butt sides of curing paper tight; do not overlap sides of curing paper.
4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Urethane Flooring:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
2) Rewet absorptive cover and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches (150 mm) and sealed in place.
3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

g. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

h. Floors to Receive Internal Curing Admixture:
1) Dose per manufacturer's instructions
2) No other form of curing is necessary in these indicated areas
3) Do not add water to the surface. Nano-silica finishing aids may be used on the surface.

3.11 TOLERANCES

A. Conform to ACI 117 (ACI 117M).

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

C. Coordinate with Finishes prior to application for compatibilities.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.

    a. Limit cut depth to 3/4 inch (19 mm).
    b. Make edges of cuts perpendicular to concrete surface.
    c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    d. Fill and compact with patching mortar before bonding agent has dried.
    e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

    a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

        1) Project name.
        2) Name of testing agency.
        3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
        4) Name of concrete manufacturer.
        5) Date and time of inspection, sampling, and field testing.
        6) Date and time of concrete placement.
        7) Location in Work of concrete represented by samples.
        8) Date and time sample was obtained.
        9) Truck and batch ticket numbers.
        10) Design compressive strength at 28 days.
        11) Concrete mixture designation, proportions, and materials.
        12) Field test results.
        13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
        14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;.

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

a. Non-posttensioned concrete: Cast and laboratory cure two sets of two 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.

b. Posttensioned concrete: Cast and laboratory cure three sets of two 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
c. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

a. Non-posttensioned: Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.

b. Posttensioned: Test one set of two laboratory-cured specimens at three days, one set of two at seven days, and one set of two specimens at 28 days.
c. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.

d. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

        1) Acceptance criteria for concrete strength to be in accordance with ACI 301 (ACI 301M), Section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 24 hours of completion of floor finishing and promptly report test results to Architect.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

SECTION 04 22 00 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Provide unit masonry for walls and partitions:

1. Interior concrete masonry firewalls.

1.02 SUBMITTALS

A. Submit for approval samples, product data, and test reports.

B. Submit CMU wall and reinforcing shop drawings. Shop drawings shall include plans, details, and full to-scale wall elevations indicating all openings, wall dimensions, bond beams and additional grouted cells as detailed in the contract drawings. Shop drawings shall detail and layout out all embed plates. Masonry construction shall not begin until shop drawings as outlined above have been submitted and approved.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Pre-Installation Conference: Prior to installation of brickwork, organize a pre-installation conference onsite to discuss pattern, texture and colors.

PART 2 - PRODUCTS

2.01 MATERIALS

B. Concrete masonry unit: Lightweight, ASTM C 140 and C 90 Type II, Grade N; 7-5/8" (and 11 5/8”) by 15-5/8" face size. Special shapes as indicated or as required. Provide units with minimum average net-area compressive strength of 2000 psi. Provide bullnose units at jambs and sills of all openings, and at all outside corners and end wall terminations, unless otherwise indicated.

C. Wall flashing: Self-sealing, self healing, fully adhering composite flexible flashing consisting of 32 mil thick pliable and highly adhesive rubberized asphalt compound bonded completely to 8 mil thick, high density, four ply, cross laminated polyethylene film. Manufacturer producing a product that conforms to this specification is W.R. Grace ‘Perm-A-Barrier’. At insulated concrete forms, coordinate installation of self-adhered membrane flashing at wall openings and self-adhered through-wall flashing supplied under Section 07272. Contractor shall verify wall flashing is compatible with fluid applied waterproof membrane.

D. Mortar: ASTM C 270, masonry cement mortar, Type N (veneer block only) above grade; Type M below grade; other types as required by application. Inorganic oxide mortar pigments. All 8" and 12" nominal masonry shall utilize Type M or S mortar.

E. Grout for unit masonry: Comply with ASTM C 476.

F. Reinforcing:

1. Ties and reinforcing: Hot-dipped galvanized, ASTM A 153.
2. Horizontal reinforcing: Welded ladder type, 9 gage wire with deformed side rods.
3. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Barnard Lox-All Adjustable Eye-Wire or approved equal.
4. Brick to steel stud ties: 3/16" diameter vee ties with drip, 12 gage wall slot; Hohmann & Barnard DW-10HS or approved equal.
5. Brick to ICF ties: 3/16" diameter adjustable V-shaped wire tie with vertically oriented 16 gage embedded anchor plate; FERO Corporation ICF-Masonry V-Tie System or approved equal.
6. Reinforcing bars: Deformed bars, ASTM A 615, Grade 60.

G. Miscellaneous Materials:

1. Cavity Drainage Material: 2-inch thick, high density polyethylene, 90% open mesh, dovetail shaped to maintain unobstructed drainage at weep holes; Mortar Net Green or approved equal.
2. Weep Holes: Rectangular plastic tubing with cotton wick and stainless steel screen, clear butyrate, 3/8" x 1-1/2" x 3-1/2"; Hohmann & Barnard 342W/S or approved equal. Install minimum of 4" above finish grade.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with PCA "Recommended Practices for Laying Concrete Block" and BIA Tech Notes 11, 11A, 11B, 11C, 11D, and 11E.

B. Weather Protection: Cold weather; heat mortar water and sand, enclose walls and provide temporary heat as recommended by BIA Tech Notes 1, 1A, 1B, and 1C. Hot weather; use mortar within 1-1/2" hours after mixing for ambient 80 degrees F or above.

C. Tolerances: From dimensions and locations in Contract Documents for plumb, level and alignment, plus or minus 1/8 in 20'.

D. Fire-Rating: Where indicated, provide assemblies identical to tested assemblies and accepted by authorities having jurisdiction.

E. Bond: Lay CMU in running bond except in areas of special coursing as indicated on Drawings.

F. Joints: Maintain uniform 3/8" width; tool concave. Provide full bed, head and collar joints except at weep holes; keep cavity clean at cavity walls.

G. Coordinate installation of flashings; prepare masonry surfaces smooth and bed flashings in mortar. Comply with manufacturer's instructions for asphaltic membrane flashings.

H. Provide L and T sections of reinforcing at corners and intersections. Lap reinforcing a minimum of 6". Reinforce masonry openings greater than 1'-4" wide with horizontal reinforcement as detailed in the structural contract drawings immediately above the lintel and below the sill. Extend the reinforcement a minimum of 2'-0" beyond jambs of the openings.

I. Ties and Horizontal Reinforcing: Comply with codes; space ties not more than 16" o.c. vertically and horizontally.

J. Provide additional vertical reinforcing on each side of wall openings as detailed in the structural contract drawings.

K. Remove and replace damaged units. Enlarge holes in mortar and re-point. Prepare joints to receive sealants. Clean brick using bucket and brush method; comply with BIA Tech Note 20. Clean Concrete masonry by dry brushing; comply with NCMA TEK No. 28.

L. Provide vertical masonry control joints in all masonry at 24’-0” on center maximum spacing and as detailed in the contract drawings.

3.02 FIELD QUALITY CONTROL

A. Special Inspections: This is a threshold project per Florida Statutes and therefore requires special inspections. The contractor shall coordinate all testing and inspections required per the threshold inspection plan found on sheets S-0.3 and S-0.4 of the contract drawings.

B. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.

C. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below, in the threshold inspection plan on the drawings, and prepare test reports:

1. Payment for these services will be made by Owner.

2. Cost of Re-inspections by the Inspector due to non-conforming items found during the initial inspection shall be paid by the contractor.

D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.

G. Field Testing of Mortar: Take at least three specimens of mortar each day. Spread a layer of mortar 1/2 to 5/8 inch thick on the masonry units and allowed to stand for one minute.

Prepare and test the specimens for compressive strength in accordance with ASTM C780. Submit test results for owner/threshold inspector review and comment.

H. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

I. Field Testing of Grout: Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 3000 psi at 28 days. Submit test results.

END OF SECTION 04 22 00

SECTION 04 26 13 - MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay face brick.

B. Products Installed but Not Furnished under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

1.2 ACTION SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: For each type of product. Manufacturer's catalog data, detail sheets, and specifications.

C. Selection Samples: For each product requiring color/texture selection, provide full size samples for final selection.

D. Samples for Verification: For each type and color of brick and colored mortar. For each product, provide two full-size units representing actual color and texture of products to be installed.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of unit masonry with other veneer work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store masonry units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained, and contamination can be avoided.

1.5 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace 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 and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years' experience demonstrated in installing products of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.
1. Construct sample panel at location indicated or directed, and as follows:
2. Coordinate size and installation with Specification Section 04 42 00 Exterior Stone Cladding. Provide enough area to depict the brick pattern per drawings.
3. Include all unit types and sizes to be used, and mortar joint treatment.
4. Obtain architect's acceptance of sample panel before beginning construction activities of this section.
5. Do not remove sample panel until construction activities of this section have been accepted by architect.

D. Certificates: Prior to delivery, submit to Architect/Engineer certificates attesting compliance with the applicable specifications for grades, types or classes included in these specifications.

E. Costs of Tests: Cost of tests shall be borne by the purchaser, unless tests indicate that units do not conform to the requirements of the specifications, in which case cost shall be borne by the seller.

1.7 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Endicott Clay Products Co., which is located at: 57120 707th Rd.; Endicott, NE 68350; Tel: 402-729-3315; Fax: 402-729-5804;

Email: Heather Morain 850-333-4946 (hmorain@southalabamabrick.com);
Web: http://www.endicott.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00 – Substitution Procedures and only **PRIOR TO BID**. Substitutions **will not** be considered after bid. See Division 0 for bidding requirements.

2.2 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 will be exposed in the completed Work.

2.3 BRICK

A. Shapes: 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 that have been manufactured to match the Endicott product with surfaces being exposed per approved drawings.

B. Clay Face Brick: Facing brick complying with ASTM C 216. Grade MW above grade, type SW below grade
1. Type FBX.
2. Initial Rate of Absorption: Less than 5 g/30 sq. in. per minute when tested according to ASTM C 67. (Applicable depending on which color is selected.)
3. Compressive Strength: Not less than 13,000 psi when tested according to ASTM C 67.

4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
5. Utility Size, 3-5/8 inches (92.1 mm) deep, 3-5/8 inches (92.1 mm) high, 11-5/8 inches (295.3 mm) long
6. Color and Texture: To be selected by architect from a full range of manufacturer's selection from Wire Cut product lines. Basis of Design for color selections for Endicott:
   a. BR-1 - Copper Canyon
   b. BR-2 - Red Blend
   c. BR-3 – Bordeaux Blend
   d. See drawings for additional information.

2.4 MORTAR MATERIALS

A. Mortar shall conform to ASTM C 270 under the guidelines provided in BIA Technical Notes #8 Series.

B. 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.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. 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.

F. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Water: Potable.

2.5 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch 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.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick, steel sheet, galvanized after fabrication].
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.

E. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Fabricate wire connector sections from 0.187-inch- diameter, hot-dip galvanized, carbon-steel wire.

5. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a gasketed sheet metal anchor section, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and base for inserting wire tie.

6. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except with hex washer head and neoprene or EPDM washer, No. 10 diameter and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B 117.

2.6 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.

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

1. Available Products: See drawings for flashing products.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Full Head Weep/Vent Products: Use the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advanced Building Products Inc.
b. CavClear/Archovations, Inc.
c. Heckmann Building Products, Inc.
d. Mortar Net Solutions.

2. Configuration: Provide one of the following:

a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
b. Strips, not less than 1-1/2 inches thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

2.8 MASONRY CLEANERS

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

2.9 MORTAR 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.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Use Type N unless another type is indicated.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. 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.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.5 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached 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 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 16 inches o.c. vertically and horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 24 inches, around perimeter.

B. Provide not less than 2 inches of airspace between back of masonry veneer and face of insulation.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.8 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect adjacent stone and nonmasonry surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.9 MASONRY WASTE DISPOSAL

A. 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 04 26 13

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SECTION 04 42 00 - CALCIUM SILICATE MANUFACTURED MASONRY UNITS

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. Calcium silicate masonry units.

B. Related Requirements:

1. Section 03 10 00 "Concrete Forming and Accessories" for installing inserts in concrete for anchoring masonry units cladding.
2. Section 04 20 00 "Unit Masonry" for installing inserts in unit masonry for anchoring masonry units cladding.
3. Section 07 92 00 "Joint Sealants" for sealing joints in masonry units cladding system with elastomeric sealants.

1.3 REFERENCES

A. TMS 402- [__]: Building Code Requirements for Masonry Structures.

B. TMS 602-[__]: Specifications for Masonry Structures.

C. ASTM C73-[__]: Standard Specification for Calcium Silicate Face Brick.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of masonry units , masonry units accessory, and manufactured product.

B. Shop Drawings: Show fabrication and installation details for masonry units cladding assembly, including dimensions and profiles of masonry units.

1. Show locations and details of joints both within masonry units cladding assembly and between masonry units cladding assembly and other construction.
2. Include details of mortar joints.
3. Show locations and details of anchors and backup structure.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Samples for Verification: Sets for each variety, color, and finish of masonry units required; not less than 12 inches square.

1. Sets consist of at least two Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the

standard by which masonry units will be judged.

E. Colored Pointing Mortar Samples for Verification: For each color required. Make Samples using same sand and mortar ingredients to be used on Project.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Test Reports:

1. Test Reports: For each masonry units variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer complying with requirements in Section 07 92 00 "Joint Sealants" and indicating that sealants will not stain or damage masonry units . Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

C. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

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.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate masonry unit assemblies similar to that required for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: A firm or individual experienced in installing masonry unit assemblies similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

C. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

D. 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 of typical exterior wall area not less than 72 inches long by 72 inches high.

a. Include typical components, attachments to building structure, and methods of installation.
b. Include sealant-filled joint complying with requirements in Section 07 92 00 "Joint Sealants."

c. Include an area that has been damaged and repaired.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. 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 and handle masonry units and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Deliver calcium silicate masonry units in protective film. Prevent damage to units
2. Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.
3. Store masonry units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to masonry units. Ventilate under covers to prevent condensation.
4. Stack units on timbers or platforms at least 3 inches above grade.
5. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.
6. .Cover stored units with protective enclosure if exposed to weather.
7. .Do not use salt or calcium-chloride to remove ice from masonry surfaces.

1.9 FIELD CONDITIONS

A. Protect masonry units cladding during erection by doing the following:

1. Cover tops of masonry units cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold securely in place.
2. Prevent staining of masonry units from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging masonry units .
3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
4. Protect sills, ledges, and projections from mortar and sealant droppings.
5. **Failure to provide adequate protection after installation, at the Architect's direction, replace stained/damaged units at <u>no cost</u> to the owner.**

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace masonry units damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.

C. Hot-Weather Requirements: Comply with hot-weather construction and protection

requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.

D. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F or when joint substrates are wet.

1.10 COORDINATION

A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by masonry units Installer for anchoring, supporting, and flashing of masonry units assembly.

B. Time delivery and installation of masonry units cladding to avoid extended on-site storage and to coordinate with work adjacent to masonry units.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers of calcium silicate masonry units having Products considered acceptable for use:

1. Arriscraft distributed by South Alabama Brick (Whatley Supply Division)
2. 230 Ross Clark Circle, Dothan, AL 36303
3. Country: USA
4. Phone: 334-794-4173
5. Email: Heather Morain 850-333-4946 (hmorain@southalabamabrick.com)

2.2 MATERIALS

A. Calcium Silicate Masonry Units (Georgia): to ASTM C73, Grade SW; solid units that have been pressure formed and autoclaved; 3-5/8” bed depth; special shapes as indicated; and as follows:

1. Modular Size: 3-5/8” wide, 11-5/8” high, 23-5/8” long.
2. Texture: SATIN finish on exposed faces and ends.
3. Color: Limestone.
4. Product and Manufacturer’s Name: Renaissance® Masonry Units by Arriscraft.

2.3 FABRICATION TOLERANCES

A. Fabricate calcium silicate masonry units to the following tolerances:

1. Unit Length: plus or minus 1/16”.
2. Unit Height: plus or minus 1/16”.
3. Deviation From Square: plus or minus 1/16”, with measurement taken using the longest edge as the base.
4. Bed Depth: plus or minus 1/8”.
5. Custom Unit Dimensions: plus or minus 1/8”.

2.4 FASTENERS

A. See drawings for types and spacing.

2.5 MORTAR MIXES

A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and

with optimum performance characteristics.

1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.

B. Portland Cement-Lime Setting Mortar: Comply with ASTM C270, Proportion Specification, Type N.

1. Set lime masonry units with Type N mortar.

C. Pointing Mortar: Comply with ASTM C270, Proportion Specification, Type N. Provide pointing mortar mixed to match Architect's sample and complying with the following:

1. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
2. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
3. Point masonry units with Type N mortar.

2.6 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform source quality-control testing.

1. Retesting of materials that fail to meet specified requirements is done at Contractor's expense.
2. Furnish test specimens randomly selected from same blocks as actual materials proposed for incorporation into the Work.
3. Test compressive strength and absorption from specimens selected at random from plant production.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive masonry units and conditions under which masonry units cladding will be

installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of masonry units cladding.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of masonry units.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF MASONRY UNITS CLADDING, GENERAL

A. Before setting masonry units , clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean masonry units by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Execute masonry units cladding installation by skilled mechanics and employ skilled masonry units fitters at Project site to do necessary field cutting as masonry units is set.

1. Cut masonry units with wet-saw.
2. Pre-soak units using clean water prior to cutting.
3. Clean cut units using a stiff fibre brush and clean water. Allow units to surface dry prior to placement.
4. Finish cut edges to match face when exposed in wall.

C. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.

D. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.

1. Sealing expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
2. Keep expansion joints free of mortar and other rigid materials.

E. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water, to divert water to building exterior.

F. Keep cavities open where unfilled space is indicated between back of masonry units units and backup wall; do not fill cavities with mortar or grout.

1. Place full head weep/vents in joints where moisture may accumulate, including at base of cavity walls and above shelf angles and flashing. Locate weep holes at intervals not exceeding 32 inches. Use weep and vent tubes.
2. Place vents in cavity walls at tops of cavities, below shelf angles and flashing, and at intervals not exceeding 20 feet vertically. Locate vents in joints at intervals not exceeding 60 inches horizontally. Use weep and vent tubes.

3.3 WETTING MASONRY UNITS

A. Where the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph, pre-wet masonry units.

B. Lay wetted units when surface dry.

3.4 COURSING

A. Place masonry to lines and levels indicated.
B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
C. Lay masonry units in half-running bond.
D. Course one masonry unit and one mortar joint to equal 12 inches.
E. Maintain mortar joint thickness of 3/8 inch.
F. Tool mortar joints by compacting the surface when thumbprint hard, to a concave finish.

3.5 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
B. Fully bond intersections, and external corners.
C. Do not adjust masonry units after laying. Where resetting of masonry is required, remove, clean units and reset in new mortar.
D. Install loose steel lintels as scheduled.
E. Install wall ties and anchorages as specified in Section 04 26 13
F. Install flashings, vents, and masonry accessories as specified in Section 04 26 13
G. Construct movement joints as specified in Section 04 26 13

3.6 INSTALLATION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, corners and jambs from within 20 feet of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch in 40 feet or more.

B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/4 inch.

E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch or a quarter of nominal joint width, whichever is less. For joints within 60 inches of each other, do not vary more than 1/8 inch or a quarter of nominal joint width, whichever is less from one to the other.

F. Variation in Plane between Adjacent Masonry units Units (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units.

3.7 FIELD QUALITY CONTROL

A. Architect Inspection: Architect will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.
B. Masonry will be inspected to be free of cracks or other blemishes on the finished face or front edges of the masonry units exceeding 3/8 inch or that can be seen from a distance of 20 feet.
C. Units shall exhibit a texture approximately equal to the approved sample when viewed under diffused daylight illumination at a 20 foot distance.
D. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under diffused daylight illumination from a 20 foot distance.
E. Efflorescence will not be cause for rejection.
F. Make Good rejected masonry as directed by Architect.

3.8 ADJUSTING AND CLEANING

A. Remove and replace broken, chipped, stained, or otherwise damaged masonry units , defective joints, and masonry units cladding that does not match approved samples and mockups. Damaged masonry units may be repaired/replaced if Architect approves methods and results.

B. Replace damaged or defective work in a manner that results in masonry units cladding's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean masonry units cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.

D. Final Cleaning: Clean masonry units cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage masonry units

E. Clean masonry units as specified in Section 04 26 13.

3.9 PROTECTION

A. Protect units from damage resulting from subsequent construction operations.
B. Use protection materials and methods which will not stain or damage units.
C. Remove protection materials upon Substantial Performance of the Work, or when risk of damage is no longer present.

END OF SECTION 04 42 00

SECTION 04 72 00 - CAST STONE 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. Cast stone trim including the following**:**
   a. Header Lintels.
   b. Sills.
   c. Water Table.

B. Related Sections:
1. Section 04 26 13 "Masonry Veneer" for installing cast stone units in unit masonry.
2. Section 04 42 00 “CALCIUM SILICATE MANUFACTURED MASONRY UNITS” for installing cast stone units in adjacent cladding.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

1. For each color and texture of cast stone required, 10 inches square in size.
2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicated types and amounts of pigments used.

E. Full-Size Samples: For each color, texture and shape of cast stone unit required.

1. Make available for Architect's review at Project site.
2. Make Samples from materials to be used for units used on Project immediately before beginning production of units for Project.
3. Approved Samples may be installed in the Work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and testing agency.

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.

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

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Furnish cast stone for installation in mockups specified in Section 04 42 00 " CALCIUM SILICATE MANUFACTURED MASONRY UNITS."

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained, and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed with or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

F. Admixtures: Use only admixtures specified or approved in writing by Architect.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C 260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast stone material.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.2 CAST STONE UNITS

A. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

C. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces. E. Cure units as follows:

5. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
6. Keep units damp and continue curing to comply with one of the following:

    a. No fewer than five days at mean daily temperature of 70 deg F or above.
    b. No fewer than six days at mean daily temperature of 60 deg F or above.

D. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

E. Colors and Textures: Provide full range from manufacturer's selection lines to be selected by the Architect.

2.3 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 04 26 13 "Masonry Veneer."

B. Portland Cement: ASTM C 150, 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.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Davis Colors; True Tone Mortar Colors.

b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.

F. 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 thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
5. Water: Potable.

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

B. Dowels: 1/2-inch- diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

C. 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 cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.5 MORTAR MIXES

A. Comply with requirements in Section 04 20 00 "Unit Masonry" for mortar mixes.

B. Do not use admixtures including pigments, air-entraining agents, accelerators, retarders, waterrepellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use **mortar cement** mortar unless otherwise indicated.

C. Comply with ASTM C 270, Proportion Specification.

1. For setting mortar, use T**ype N**.
2. For pointing mortar, use **Type N**.

2.6 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Section 04 20 00 "Unit Masonry."

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
2. Build anchors and ties into mortar joints as units are set.
3. Fill dowel holes and anchor slots with mortar.
4. Fill collar joints solid as units are set.
5. Build concealed flashing into mortar joints as units are set.
6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated.
3. Form joint of width indicated, but not less than 3/8 inch.
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

B. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

C. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

D. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

E. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch.

F. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

G. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified

3.5 FIELD QUALITY CONTROL

A. Perform inspection and testing as specified in Section 01 40 00 - QUALITY REQUIREMENTS.

B. Test one randomly selected sample from the field for each 500 cubic feet delivered to the job site. Verify compliance with the following:

1. Three field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85 percent with no single specimen testing less than 75 percent of design strength as allowed by ACI 318.

2. Three field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6 percent.

C. Architect inspection: Architect will inspect installed masonry and reject masonry that is chipped, cracked, or blemished (streaked, stained or otherwise damaged), as described below.

1. Masonry will be inspected to be free of chips, cracks or other blemishes on the finished face or front edges of the masonry units exceeding 3/8 inch or that can be seen from a distance of 10 feet.

2. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 feet distance.

3. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20 feet distance.

4. Crazing and efflorescence will not be cause for rejection.

D. Make Good rejected masonry as directed by Architect.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 04 72 00

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes structural steel.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show fabrication of structural-steel components, including connections (as designed by delegated design engineer), stairs and railings (as designed by delegated design engineer), splices, holes, welds, and bolts.

C. Signed and Sealed Shop Drawings and Calculations: Provide signed and sealed shop drawings and calculations for all delegated designs including connection designs, stairs and railings. Delegated Design Engineer shall be licensed in the project state.

D. Mill certificates.

E. Welding certificates.

1.3 QUALITY ASSURANCE

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

B. 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."

1.4 STORAGE AND PROTECTION

A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.

B. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated. All connections shall be coordinated with the sizes and details shown in the contract drawings.

1. Select and complete connections using schematic details indicated and AISC 360.

2.2 MATERIALS

A. Structural-Steel Shapes, Plates, and Bars: ASTM A 36, carbon steel or ASTM A 572, Grade 50, high-strength, low-alloy columbium-vanadium steel. See construction drawings.

B. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B.

C. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated. All high-strength bolts shall be twist-off type torque indicating bolts.

D. Typical Shop Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer, except where noted in "Shop Priming" below.

E. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.

2.3 GROUT

A. 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.

2.4 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Comply with fabrication tolerance limits in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
2. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

    a. Connection Type: Bolts shall be twist-off type torque indicating bolts.

3. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

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.

2.5 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 or receive headed shear studs.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing). Refer to architectural drawings for locations.
5. Galvanized surfaces.
6. 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 (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

D. Coordinate shop primer with high performance paint system requirements selected by the contractor at the exterior cross and steel canopy framing locations. Fabricator/Contractor coordination is required prior to priming.

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 embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Examination: Verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

C. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.

1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

E. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Connection Type: Bolts shall be twist-off type torque indicating bolts.

F. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

G. Field Touch-Up and Repair: All areas damaged during shipping, storage (scaling rust), welding and erection shall be cleaned in accordance with SSPC-SP 11 Power Tool Cleaning to Bare Metal to remove all loose or damaged coatings, rust and any other foreign matter. Contractor shall field apply primer and paint system as required based on location per section 2.2B above.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: This is a threshold project per Florida Statutes and therefore requires special inspections. The contractor shall coordinate all testing and inspections required per the threshold inspection plan found on sheets S-0.3 and S-0.4 of the contract drawings.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Field Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

END OF SECTION 05 12 00

SECTION 05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL METAL FRAMING

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. Architecturally exposed structural METAL(AESM).
2. Section 05 12 00 "Structural Steel Framing" requirements that also apply to AESS.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.
2. Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting" for surface preparation and priming requirements.

1.3 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

B. Category AESS 4: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 4 and is designated as AESS 4 or Category AESS 4 in the Contract Documents.

C. SEAC/RMSCA Guide Specification: SEAC/RMSCA's "Sample Specification, Section 05 02 13: Architecturally Exposed Structural Steel."

1.4 COORDINATION.

A. Coordinate surface preparation requirements for shop-primed items.

B. 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.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Tension-control, high-strength, bolt-nut-washer assemblies.
2. Corrosion-resisting (weathering steel), tension-control, high-strength, bolt-nut-washer assemblies.
3. Filler.
4. Primer.
5. Galvanized-steel primer.
6. Etching cleaner.
7. Galvanized repair paint.

B. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate orientation of mill marks and HSS seams.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
7. Indicate exposed surfaces and edges and surface preparation being used.
8. Indicate special tolerances and erection requirements.
9. Indicate weep holes for HSS and vent holes for galvanized HSS.
10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

C. Samples: Submit Samples to set quality standards for AESS.

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.
3. Round steel tube or pipe, minimum 8 inches in diameter, with end of another round steel tube or pipe, approximately 4 inches in diameter, welded to its side at a 45-degree angle with a continuous fillet weld and with weld ground smooth and blended.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, and shop-painting applicator.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AESS similar to that indicated on this Project.

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category CSE, and is experienced in erecting AESS similar to that indicated on this Project.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3.

D. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.

1. Build mockup of typical portion of AESS as shown on Drawings.
2. Coordinate painting requirements with Section 099113 "Exterior Painting." Section 099123 "Interior Painting."
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.

1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

2.2 METAL

A. Provide Aluminum in lieu of Steel. This Applies to all exterior canopy type structures.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. Tension-Control, High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, round-head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

B. Corrosion-Resisting (Weathering) Steel, Tension-Control, High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 3, round-head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 3, hardened carbon-steel washers.

2.4 FILLER

A. Polyester filler intended for use in repairing dents in automobile bodies.

2.5 PRIMER

A. Steel Primer:
1. SSPC-Paint 23, latex primer.

B. Galvanized-Steel Primer: MPI#26.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 [].

2.6 FABRICATION

A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

B. Category AESS 4:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.
17. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
18. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
19. Orient HSS seams as indicated or away from view.
20. Align and match abutting member cross sections.
21. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch. At closed joints, maintain uniform contact within 1/16 inch.
22. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.
23. Treat HSS seams to appear seamless.
24. Contour and blend welds and weld transitions between members, removing splatter exposed to view.
25. Fill surface imperfections with filler and sand smooth to achieve surface quality approved by Architect.
26. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.

C. Erection marks, painted marks, and other marks are permitted on galvanized- steel surfaces of completed structure.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength 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.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
3. Galvanize AESS steel members attached to structural-steel frame and located in exterior walls.

2.9 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.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Corrosion-resisting (weathering) steel surfaces.
5. Galvanized surfaces.

B. Surface Preparation: Clean nongalvanized 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 8.

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner or according to SSPC-SP 16.

D. 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.

1. Stripe paint corners, crevices, bolts, welds, and eased edges.

2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.

B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.

1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
2. Grind tack welds smooth.
3. Remove backing and runoff tabs, and grind welds smooth.
4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
5. Remove erection bolts in Category AESS 4 AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
6. Fill weld access holes in Category AESS 4 AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
7. Conceal fabrication and erection markings from view in the completed structure.

B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.

1. Erection of Category AESS 4:

    a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
    b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
    c. Remove weld spatter, slivers, and similar surface discontinuities.
    d. Grind off butt and plug weld projections larger than 1/16 inch.
    e. Continuous welds shall be of uniform size and profile.
    f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
    g. Splice members only where indicated on Drawings.
    h. No torch cutting or field fabrication is permitted.
    i. Weld profiles, quality, and finish shall be as approved by Architect.
    j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.
    k. Grind welds smooth.
    l. Minimize weld show-through and distortion on the opposite side of exposed connections by grinding to a smooth profile aligned with adjacent material.
    m. Oversize welds where ground, contoured, or blended, and grind to provide a smooth transition, matching profile approved by Architect.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength 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.

3.5 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

    1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting, to comply with SSPC-PA 1 for touching up shop-painted surfaces.

        a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 05 12 13

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SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

3.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

3.03 SUMMARY

A. Section Includes:

1. Roof deck.

3.04 ACTION SUBMITTALS

A. Product Data: For the following:

1. Roof deck.

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.

3.05 INFORMATIONAL SUBMITTALS

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

B. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.

2. Decking Attachment fasteners and side-lap fasteners.

C. Research Reports: For steel deck, from ICC-ES.

D. Field quality-control reports.

3.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

3.07 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

3.02 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."

B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

3.03 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 A653/A 653M, Structural Steel (SS), Grade 33 (230) minimum, with zinc coating.
2. Deck Profile: As indicated in the contract drawings
3. Profile Depth: 1-1/2 inches (38 mm) & 3-1/2 inches (89 mm).
4. Design Uncoated-Steel Thickness: As indicated in the contract drawings
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped and screwed.

3.04 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, of size indicated in drawings.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. 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.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Galvanizing Repair Paint: ASTM A780/A780M.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.02 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 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. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.04 INSTALLATION OF ROOF DECK

A. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals as noted in the construction documents

1. Mechanically fasten with self-drilling, screws as indicated on the drawings.

B. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum

C. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

D. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.05 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.06 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.

END OF SECTION 053100

SECTION 05 40 00 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Exterior non-vertical-load-bearing wall framing.

B. Related Sections include the following:
   1. Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
   2. Division 9 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
   3. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design Loads: See structural drawings.
   2. Deflection Limits: Design framing systems to withstand component and cladding wind pressures as shown in structural drawings or per FBC2020 edition.
   3.
      a. Exterior Wall Framing not backing up brick veneer: Maximum deflection of 1/360 of the wall height at wind loads provided on the contract drawings.
      b. Exterior Wall Framing backing up brick veneer: Maximum deflection of 1/600 of the wall height at wind loads provided on the contract drawings.

   4. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
   5. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
      a. Upward and downward movement of 3/4 inch.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings for metal stud walls: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work, including but not limited to connection to parapet walls or slab:
   1. Submittal shall include structural analysis data and calculations signed and sealed by the qualified professional engineer registered in the state of Florida.
   2. Calculations shall show that that all components are able to resist gravity loads, component and cladding wind pressures, and seismic loads.
   3. Indicate load and non-load bearing walls in shop drawings.
   4. Shop drawings shall include complete wall elevations indicating framing requirements in each location.
   5. Shop drawings shall include sections and details of each stud framing condition.

C. Welding certificates.

D. Qualification Data: For professional engineer and testing agency.

E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Steel sheet.
   2. Expansion anchors.
   3. Power-actuated anchors.
   4. Mechanical fasteners.
   5. Vertical deflection clips.
   6. Horizontal drift deflection clips
   7. Miscellaneous structural clips and accessories.

F. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. 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 cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

C. Steel studs shall be straight and plumb up to tolerance of 1/4" at site before installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
1. Dietrich Metal Framing; a Worthington Industries Company.

2.2 MATERIALS

A. All components, sheets, screws, etc., to be galvanized.

B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: Per manufacturer.
2. Coating: G90.

C. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: Per manufacturer.
2. Coating: G90.

2.3 WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Size and spacing: To be designed by light gage manufacturer unless shown in structural drawings.
   2. Section Properties: Per SSMA standard

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges; to be designed by light gage manufacturer unless shown in structural drawings.

C. Vertical Deflection Clips: Shall be provided for all non-load bearing walls only. Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dietrich Metal Framing; a Worthington Industries Company.
   2. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.

D. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges designed to support horizontal and lateral loads and transfer them to the primary structure

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Foundation clips.
   7. Stud kickers, knee braces, and girts.
   8. Hole reinforcing plates.
   9. Backer plates.
   10. Uplift clips.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

D. Sealer Gaskets: Closed-cell neoprene foam, thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/2" from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Anchorage to post tensioned slab shall not be deeper than 1", unless the contractor provides X-ray to locate every tendon and reinforcing in the area prior to installation.

B. For all anchorage deeper than 1" into concrete, contractor shall provide X-ray or ground penetration radar (GPR) to locate constructed tendons or reinforcing prior to installation.

C. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

D. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

E. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding.

F. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

G. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

H. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

I. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

J. Install insulation, specified in Division 7 Section "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

K. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

L. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of and as follows:
   1. Space individual framing members no more than plus or minus ¼" from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

C.
   1. Stud Spacing: Walls shall be designed by manufacturer to withstand wind pressures for components and claddings shown in structural drawings and seismic force per ASCE 7-10, but not greater than 1'-4" on center.

D. Set studs shall be plumb up to tolerance of 1/8" maximum and level up to ¼" maximum, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements. All nonplumb or nonstraight studs shall be replaced at contractor's cost.

E. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
   4. Connect drift clips to cold formed metal framing and anchor to building structure.

F. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 6 feet apart. Fasten at each stud intersection.
   1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
      a. Install solid blocking as required to withstand design loads.
   2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs. Bridging shall be spaced at 48”o.c. maximum.
   3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges. Shall be provided for all non-load bearing walls.
   4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions. Shall be provided for all non-load bearing walls.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

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

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

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SECTION 05 44 00 - COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Roof trusses.

1.03 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel truss materials.
2. Anchor bolts.
3. Post-installed anchors.
4. Power-actuated fasteners.
5. Mechanical fasteners.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3. Truss Connections shall be field welded to embed plates. Mechanical anchorage to the embed plates or top of wall is not acceptable.

C. Delegated-Design Submittal: For cold-formed steel trusses.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

1. Steel sheet.
2. Mechanical fasteners.
3. Miscellaneous structural clips and accessories.

C. Research Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

D. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. 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."

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel trusses.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
   a. Roof Trusses: Vertical deflection of 1/360 of the span.

3. Design trusses to provide for movement of truss members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Truss Standards: Unless more stringent requirements are indicated, trusses shall comply with the following:

1. Floor and Roof Systems: AISI S210.
2. Lateral Design: AISI S213.
3. Roof Trusses: AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.02 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

B.

1. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90).

2.03 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.

1. Connecting Flange Width: 1-5/8 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
2. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
3. Section Properties: 33 KSI Min.

2.04 TRUSS ACCESSORIES

A. Fabricate steel-truss accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.05 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36 min, threaded carbon-steel hex-headed bolts, steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.06 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Shims: Load-bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as truss members supported by shims.

2.06 FABRICATION

A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate trusses using jigs or templates.
2. Cut truss members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses by means of that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual truss members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, conditions, and abutting trusses and framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

3.03 INSTALLATION

A. Install bridge, and brace cold-formed steel trusses according to AISI S200, AISI S202, AISI S214, and manufacturer's written instructions unless more stringent requirements are indicated.

1. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure.
2. Anchor trusses securely at all bearing points.
3. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's Technical Note 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses.".

B. Install cold-formed steel trusses and accessories true to line and location, and with connections securely fastened.

1. Erect trusses with plane of truss webs plumb and parallel to each other. Align and accurately position trusses at required spacings.
2. Erect trusses without damaging truss members or connections.
3. Fasten cold-formed steel trusses utilizing welded connections.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

C. Install temporary bracing and supports to secure trusses and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to trusses are secured.

D. Truss Spacing: 48 inches (1220 mm) maximum spacing.

E. Do not alter, cut, or remove truss members or connections of trusses.

3.04 ERECTION TOLERANCES

A. Install cold-formed steel trusses level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.05 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel trusses with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.06 FIELD QUALITY CONTROL

A. Inspections: Owner will engage an inspector to perform inspections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Cold-formed metal trusses will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.07 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 44 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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1. Miscellaneous framing and supports.
2. Shelf angles.
3. Elevator pit sump covers.
4. Structural-steel door frames.
5. Miscellaneous steel trim.
6. Metal bollards.
7. Pipe and downspout guards.
8. Loose bearing and leveling plates.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
2. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.
3. Section 077200 "Roof Accessories" for manufactured metal roof walkways and metal roof stairs.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Fasteners.
3. Shop primers.
4. Shrinkage-resisting grout.
5. Slotted channel framing.
6. Metal bollards.
7. Pipe and downspout guards.

8. Abrasive metal nosings, treads, and thresholds.
9. Metal downspout boots.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Elevator machine beams, hoist beams, and divider beams.
3. Steel shapes for supporting elevator door sills.
4. Shelf angles.
5. Elevator pit sump covers.
6. Structural-steel door frames.
7. Miscellaneous steel trim including steel angle corner guards.
8. Metal bollards.
9. Loose steel lintels.

C. Samples for Verification: For each type and finish of extruded nosing.

D. Sustainable Design Submittals:

1. Environmental product declaration.
2. Third-Party Certifications: For each product.
3. Third-Party Certified Life Cycle Assessment: For each product.

1.4 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Research Reports: For post-installed anchors.

E. Delegated design engineer qualifications.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless steel fasteners for fastening aluminum.
2. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy- hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.

D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

F. Anchors, General: 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 in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

H. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than

3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting."

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal- weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion

   resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

1. Provide bearing plates welded to beams where indicated.
2. Drill or punch girders and plates for field-bolted connections where indicated.
3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.

E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.

F. Galvanize miscellaneous framing and supports where indicated.

G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.6 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize and prime shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with zinc-rich primer.

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in- place concrete.

2.7 ELEVATOR PIT SUMP COVERS

A. Fabricate from 1/8-inch floor plate with four 1-inch- diameter holes for water

drainage and for lifting.

B. Fabricate from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.

C. Provide steel angle supports unless otherwise indicated.

2.8 STRUCTURAL-STEEL DOOR FRAMES

A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.

1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.

B. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.

C. Galvanize and primesteel frames.

D. Prime exterior steel frames with zinc-rich primer.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and primemiscellaneous steel trim.

D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.10 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.

1. Cap bollards with 1/4-inch- thick, steel plate with domed top.
2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.

B. Fabricate bollards with 3/8-inch- thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.

1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

C. Fabricate sleeves for bollard anchorage from steel or stainless steel pipe with 1/4-inch- thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

D. Fabricate internal sleeves for removable bollards from Schedule 80 steel pipe or 1/4-inch wall- thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch steel machine bolt.

E. Prime steel bollards with zinc-rich primer.

2.11 PIPE AND DOWNSPOUT GUARDS

A. Fabricate downspout guards from 3/8-inch- thick by 12-inch- wide, steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch clearance between pipe and pipe guard. Drill each end for two 3/4-inch anchor bolts.

B. Galvanize and prime steel downspout guards.

C. Prime steel downspout guards with zinc-rich primer.

2.12 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize bearing and leveling plates.

C. Prime plates with zinc-rich primer.

2.13 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.14 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.16 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to, and rigidly brace from, building structure.

C. Anchor shelf angles securely to existing construction with expansion anchors.

D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

E. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLATION OF SHELF ANGLES

A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.

3.4 INSTALLATION OF METAL SHIPS' LADDERS AND PIPE CROSSOVERS

A. Secure top and bottom of ships' ladders to construction to comply with manufacturer's written instructions.

B. Secure pipe crossovers to construction to comply with manufacturer's written instructions.

3.5 INSTALLATION OF ELEVATOR PIT SUMP COVERS

A. Install tops of elevator sump pit cover plates and frames flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.6 INSTALLATION OF STRUCTURAL-STEEL DOOR FRAMES

A. Fasten structural steel door frames to the floor slab by means of angle clips and expansion bolts. Anchor door jambs to adjacent construction in accordance with shop drawing details.

3.7 INSTALLATION OF MISCELLANEOUS STEEL TRIM

A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.8 INSTALLATION OF METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.

B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least 4 inches in concrete.

C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

E. Anchor internal sleeves for removable bollards in concrete by inserting in pipe sleeves preset into concrete. Fill annular space around internal sleeves solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward internal sleeve.

F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.

G. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.

H. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.9 INSTALLATION OF PIPE AND DOWNSPOUT GUARDS

A. Provide pipe guards at exposed vertical pipes in at locations indicated on Drawings where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard. Mount pipe guards with top edge 26 inches above driving surface.

3.10 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.11 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and

abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

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SECTION 05 51 13 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.

1.2 ACTION SUBMITTALS

A. Product Data: For metal pan stairs.

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. Fabricator Qualifications:

1. Minimum [10] years' experience in design and fabrication of custom steel stairs and railings.

2. AISC Certified Fabricator.

B. Installer Qualifications: Firm specializing in work of this Section, with minimum 2 years' experience.

C. Fabricate stair assembly to NAAMM AMP 510, Commercial Class.

D. Fabricate guard rails and handrails in accordance with ASTM E985.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Alfab, Inc.
2. American Stair, Inc.

3. Lapeyre Stair Inc.
4. Pacific Stair Corporation.
5. Worthington Metal Fabricators.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design stairs and railings.

B. 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..
2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

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, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

1. Style Designation: 3/4 number 13.

E. Woven-Wire Mesh: Intermediate-crimp, diamond pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 510.

F. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.4 FASTENERS

A. Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, 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.

2.5 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting." Section 09 96 00 "High-Performance Coatings."

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

D. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
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 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. 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.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.7 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 channels.

    a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
5. 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.

D. Metal Smooth Stairs: Form risers, sub-treads, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

2.8 FINISHES

A. Finish metal stairs after 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. Install stairs in accordance with manufacturer's instructions and approved Shop Drawings.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.

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 03 30 00 "Cast-in-Place Concrete."

3.2 INSTALLING RAILINGS

A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

1. Anchor posts to steel by welding to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

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.

END OF SECTION 05 51 13

SECTION 05 52 13 - PIPE AND TUBE RAILINGS.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

2.2 METALS, GENERAL

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

1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL AND IRON

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

C. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

D. Plates, Shapes, and Bars: ASTM A 36.

2.4 FASTENERS

A. General: Provide the following:
1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153 or ASTM F 2329 for zinc coating.

B. Post-Installed Anchors: Chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594 .

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting,"Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

F. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction by bending or by inserting prefabricated elbow fittings.

F. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

G. Close exposed ends of railing members with prefabricated end fittings.

H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123 for hot-dip galvanized railings.
3. Comply with ASTM A 153 for hot-dip galvanized hardware.

B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

3.2 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.3 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 52 13

SECTION 05 73 16 – DECORATIVE METAL RAILINGS - CABLE

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 SECTION INCLUDES

A. Stainless steel railings with cable infill.

1.3 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.4 REFERENCES

A. American National Standards Institute (ANSI):
1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

B. American Welding Society (AWS):
1. AWS Specifications for Welding Rods and Bare Electrodes.

C. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

D. ASTM International (ASTM):
1. ASTM A53 - Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.
2. ASTM A269 - Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
3. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
4. ASTM A312 - Specification for Seamless and Welded Austenitic Stainless Steel Pipe.
5. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. ASTM A512 - Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing.
7. ASTM A525 - Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
8. ASTM A526 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
9. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
10. ASTM A1264-1 - Safety Requirements for Workplace Floor and Wall Openings, Stairs and Railing Systems
11. ASTM B221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes.
12. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
13. ASTM E894 - Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
14. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
15. ASTM E985 - Specification for Permanent Metal Railing Systems and Rails for Buildings.

E. National Association of Architectural Metal Manufacturers (NAAMM):
1. NAAMM Pipe Railing Manual.
2. NAAMM Metal Stair Manual.

F. National Fire Protection Association (NFPA):
1. 101 - Life Safety Code.

1.5 DEFINITIONS

A. Refer to definitions in ASTM E985 for railing-related terms that apply to this Section.

1.6 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittals Procedures.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including, but not limited to, the following:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Grout, anchoring cements and paint products.

C. Shop Drawings: Submit shop drawings showing fabrication and installation of handrails and railings. Include plans, elevations, sections, details, and attachments to other work.
1. Provide setting diagrams for installation of anchors, location of pockets, weld plates for attachment of rails to structure, and blocking for attachment of wall rail.
2. Indicate all required field measurements to be held.
3. Indicate materials, sizes, styles, fabrication, anchorage and installation details for railing system and infill.
4. Signed and Sealed Shop Drawings to be provided by a Registered Professional Engineer registered in the jurisdiction of the project.

D. Certifications:
1. Furnish certification that all components and fittings are furnished by the same manufacturer or approved by the primary component manufacturer.
2. Furnish certification that components were installed in accordance to the manufacturer's engineering data to meet the specified design loads.

E. Samples:
1. Post and rail sections, minimum 4 inch (100 mm) long piece of each type.
2. lnfill Cable: Minimum 8 inch (200 mm) long piece with end fittings.
3. Verification Samples: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
a. 6 inches (152 mm) long sections of each different linear railing member, including top rails.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of aluminum handrails and railings of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of 5 years.

B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

C. Installer Qualifications: Minimum 2 years experience installing similar systems.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and

application workmanship.
1. Install one complete railing including infill panel at location selected by Architect.
2. Obtain Architect's approval prior to installing additional railings.
3. Refinish mock-up area as required to produce acceptable work.
4. Approved sample may remain as part of completed work.

E. Pre-Installation Meeting:
1. Prior to the beginning of work, conduct a pre-job conference at the job site.
2. Provide seven calendar days advance written notice ensuring the attendance by competent authorized representatives of the fabricator, building owner's representative, architect and subcontractors whose work interfaces with the work of this section.
3. Review the specifications to determine any potential problems, changes, scheduling, unique job site conditions, installation requirements and procedures and any other information pertinent to the installation.
4. Record the results of the conference and furnish copies to all participants.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.10 WARRANTY

A. Special Warranty: Provide manufacturer's standard form outlining the terms and conditions of their standard Limited Warranty:
1. Cable and Connectors: 10 year limited warranty against defects in materials and workmanship.
2. Paint Finish on Aluminum Extrusions and Components: 10 year limited warranty against cracking, flaking, blister, and peeling.

B. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.11 EXTRA MATERIALS

A. Provide one approximately 3 ounce (85 grams) can, of touch-up paint per 100 feet (30.5 m) of each color of railing as applicable.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails:
a. Uniform load of 50 lbf/ ft. (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. 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.
3. 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. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
   c. Infill load and other loads need not be assumed to act concurrently

2.2 MANUFACTURERS

A. Acceptable Manufacturer:
   1. Stainless Cable & Railing Inc., which is located at: 3315 N.E. 112th Ave. Suite 73; Vancouver, WA 98682; Toll Free Tel: 888-686-7245 (RAIL); Tel: 360-314-4288; Fax: 888-686-7245; Email:request info (sales@stainlesscablerailing.com); Web:http://stainlesscablerailing.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.3 STAINLESS STEEL RAILINGS WITH CABLE INFILL

A. Stainless Steel Railings with Cable Infill.
   1. Mounting: Top (Deck) Mounted Posts.
   2. Rail Height: 36 inches (914 mm).
   3. Cable Railing: Horizontal.
   4. Fasteners: 4 Anchor Bolts: 3/8 inch (9.5 mm) diameter Redhead ITW wedge, with minimum 8 inch (203 mm) embedment.
   5. Top Rail Type: Wood. Ipe Brazilian Walnut Top Rail (5/4x4): Rectangular cross section 1.25 x 4 inches (32 x 102 mm)

B. Stainless Steel Components: Provide manufacturer's standard components as follows:
   1. Round Intermediate Post: 2 inch (51 mm) OD diameter x 0.065 inch (1.65 mm) thickness, type 316 stainless steel welded tubing.
   2. Round Terminal Post: 2 inch (51 mm) OD diameter x 0.157 inch (4.00 mm) thickness, type 316 stainless steel welded tubing.
      a. Spacing: Maximum 30 inches (762 mm) on center between end and intermediate posts.
   3. Cable Assemblies: 1/8 inch (3 mm) 1x19 fittings to be sized according to cable diameter. Fittings, type 316 measure grade stainless.
   4. Round Base Plate: 4-1/2 inch (114 mm) diameter by 0.35 inch (8.9 mm) minimum, type 316 stainless steel.
   5. End Caps: Stainless steel end caps for exposed open ends of rails, tubes, and profiles.
   6. Cable Grommets:
      a. Material: Ultraviolet-resistant Delrin or equivalent.
      b. Prevent abrasion of intermediate posts, end posts, and cable braces bored for cables.
      c. Color: Black.

C. Stainless Steel Material:

1. Stainless Steel: Type 316.
2. Cable: MIL-W-87161, Type II, Composition B.
3. Cable Hardware: ASTM A276 and A 479, SAE/AMS QQ-S-766, Type 316.
4. Finish: Mechanical finish AISI as indicated.

D. Stainless Steel Finish: NAAMM/NOMMA Metal Finishes Manual.
1. Stainless Steel: No. 4 satin finish.

2.4 CABLE RAILING COMPONENTS

A. Cables:
1. Material: 1 x 19, Type 316 stainless steel strand, left-hand lay, per dimensional properties contained in MIL-DTL-87161.
2. Finish: Mill.
3. Diameter: 1/8 inch (3 mm), minimum breaking strength of 1,780 pounds.
4. Spacing: Maximum 3 inches (76 mm) on center.
5. Cable Hardware Components:
a. Material: Stainless steel, ASTM A276 and A479, SAE/AMS QQ-S-763, Type 316.
b. Include washers, nuts, end caps and any accessory items as recommended by manufacturer for installation conditions or as shown on Drawings.
c. Type: Use hardware substantially concealed inside end posts wherever practical.
d. Factory Assembly: Factory Threaded Tensioner/Factory. Threaded Terminal/Acorn Nut, Hex Nut, & Stainless Washer or Cable Quick Nut & Cover.

B. Fasteners:
1. Handrail and Railing Component Anchors: Use fasteners fabricated from same basic metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
a. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are standard fastening method for handrail and railing indicated.
b. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
2. Cast-in-Place and Post Installed Anchors: Provide anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four items the load imposed when installed in concrete, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
a. Cast-in-place anchors.
b. Chemical anchors.
c. Expansion anchors.

C. Grout and Anchoring Cement:
1. Non-Shrink, Non-Metallic Grout: Provide premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
2. Interior Anchoring Cement: Provide factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at project site to create pourable anchoring, patching and grouting compound. Use for interior applications only.

2.5 FABRICATI0N

A. Fabricate handrails and railings by connecting members with railing manufacturer's standard

concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

B. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.

C. Provide inserts and other anchorage devices to connect handrails and railings to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

D. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

E. Cut, reinforce, drill, and tap components as indicated on the Drawings to receive finish hardware, screws, and similar items.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide mounted handrail wall returns at wall ends unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
   1. Examine substrates to receive anchors verifying that locations of concealed reinforcements have been clearly marked for the Installer. Locate reinforcements and mark locations if not already done.
   2. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchors, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.

3.3 INSTALLATION

A. General: Install components in accordance with manufacturer's instructions and in proper relationship with adjacent construction.
   1. Fitting: Fit exposed connections together to form tight, hairline joints.
   2. Cutting and Placement: Set handrails and railings accurately in location, alignment, and elevation measured from established lines and levels and free from rack.
      a. Do not weld, cut, or abrade coated or finished surfaces of railing components that are intended for field connection by mechanical or other means without further cutting or fitting.
      b. Align rails so variations from level or parallel alignment do not exceed 1/4 inch in 12 feet (1.6 mm per m).
      c. Provide manufacturer's proprietary system to evacuate entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources, in order to prevent water from entering the

concrete slab. In lieu of the manufacturer's proprietary system, if acceptable to the Architect, provide another means to evacuate the entrapped water, i.e., a weep hole and epoxy fill system (''drill-and-fill'').

d. Anchor posts in concrete with pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, solidly fill annular space between post and sleeve with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.
e. Anchor posts in concrete by forming or core drilling holes not less than 5 inches (127 mm) deep and 3/4 inch (19 mm) greater than outside diameter of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.
f. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8 inch (3 mm) buildup, sloped away from post.
g. 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.
h. Adjusting: Adjust handrails and railings before anchoring to ensure alignment at abutting joint's space posts at interval indicated, but not less than required to achieve structural loads.
i. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

B. Non-Welded Railings Connections: Use mechanical joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings.

C. Metal Interaction:
1. When aluminum components come into contact with dissimilar metals, surfaces shall be kept from interacting through painting the dissimilar metal with a heavy coat of a proper primer. The use of plastic grommets and/or PVC sleeves is encouraged to prevent contact between stainless steel cables and aluminum hole edges.
2. When aluminum components come into contact with cement or lime mortar, exposed aluminum surfaces shall be painted with water-white methacrylate lacquer.

3.4 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, and abraded areas of shop paint, and appoint exposed areas with same material.

B. Passivation: Immediately after erection, spray passivation solution on stainless steel frame pieces and cables to restore protective layer. Use Rust Rescue in marine environments for additional protection.

C. Cleaning: Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit or provide new units.

3.5 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to the Installer that shall ensure that the aluminum handrails and railings shall be without damage at time of Substantial Completion.

B. Protect finishes of handrails and railings from damage during construction period with

temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

C. Protect stainless steel from corrosion and staining by applying passivation solution following installation and periodically thereafter. Use Rust Rescue in addition to passivator in marine environments.

D. Protect wood products from fading, checking, splitting, etc. with proper end grain sealant and oil treatment.

END OF SECTION 05 73 16

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
B. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
B. Sizes: Nominal sizes as indicated on drawings, S4S.
C. Moisture Content: S-dry or MC19.
E. Framing as indicated on drawings. (2 by 6 through 4 by 16):
   1. Species and Grades: As indicated on the drawings for various locations.
F. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 STRUCTURAL COMPOSITE LUMBER

A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
   1. Columns: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.
   2. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published E (modulus of elasticity): 1,800,000 psi, minimum.
   3. Headers Not Longer Than 48 inches: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber.

2.04 CONSTRUCTION PANELS

A. Wall Sheathing: Any PS 2 type, rated Structural I Sheathing.
   1. Bond Classification: Exterior.

2. Span Rating: 24.
3. Performance Category: 5/8 PERF CAT.

B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

C. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.05 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
3. Anchors: Toggle bolt type for anchorage to hollow masonry.

2.06 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications. All pressure treated wood blocking and plywood shall be treated with ACQ environmentally friendly pressure treatment products.
1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

PART 3 EXECUTION

3.01 INSTALLATION – GENERAL

A. Select material sizes to minimize waste.
B. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
C. Wood blocking used in roof construction shall NOT be pressure-treated per the latest NRCA recommendations.
D. All wood blocking in contact with concrete, precast concrete or CMU shall be pressure treated.
E. The use of Orient strand board is not allowed.

3.02 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
B. Install structural members full length without splices unless otherwise specifically detailed.
C. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC

(WFCM) Wood Frame Construction Manual.

D. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

3.03 INSTALLATION OF CONSTRUCTION PANELS

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

END OF SECTION

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SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.
2. Paneling.
3. Shelving and clothes rods.

1.2 DEFINITIONS

A. MDF: Medium-density fiberboard.

B. MDO: Plywood with a medium-density overlay on the face.

C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Interior trim.
2. Paneling.
3. Shelving and clothes rods.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical- treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

C. Sustainable Design Submittals:

1. Third-Party Certifications: For each product.
2. Third-Party Certified Life Cycle Assessment: For each product.
3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.

D. Samples: For each exposed product and for each color and texture specified.

E. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

F. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in..
3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.4 QUALITY ASSURANCE

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of

Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

D. MDF: ANSI A208.2, Grade 130.

E. Particleboard: ANSI A208.1, Grade M-2.

F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with ISO 4586-3, Grade VGS.

1. Color: As selected by Architect from manufacturer's full range.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC1.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

    a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

7. Application: Where indicated on Drawings.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to

provide secure attachment, concealed where possible.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

C. Installation Adhesive for Foam-Plastic Moldings: Product recommended for indicated use by foam-plastic molding manufacturer.

D. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.

2.4 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.
2. Wood-board paneling.

B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 ADJUSTING

A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.5 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.6 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim for opaque finish.
2. Preservative-treated wood material.
3. Miscellaneous materials.

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.

B. Wood-Preservative Treatment:

1. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Indicate type of preservative used and net amount of preservative retained.
3. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.

C. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

D. Sustainable Design Submittals:

1. Third-Party Certifications: For each product.
2. Third-Party Certified Life Cycle Assessment: For each product.
3. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.

E. Shop Drawings:

1. Include the following:

a. Dimensioned plans, elevations, and sections.
b. Attachment details.

2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
4. Apply AWI Quality Certification Program label to Shop Drawings.

F. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:

a. Panel Products: 12 inches by 12 inches.
b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

G. Samples for Initial Selection: For each type of shop-applied exposed finish.

1. Size:

a. Panel Products: 12 inches by 12 inches.
b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

H. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent- finished interior architectural woodwork.
3. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color.

a. Finish entire exposed surface.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For architectural woodwork manufacturer, and, Installer.

B. Product Certificates: For the following:

1. Composite wood products.
2. Adhesives.

C. Evaluation Reports: For [preservative-treated] [and] [fire-retardant-treated] wood materials, from ICC-ES.

D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in .
2. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Architectural Woodwork Standards, Section 2.

B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.

C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.8 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to

fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK

WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.2 HARDWOOD SHEET MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
5. See Drawings for specific products.

2.3 PRESERVATIVE-TREATED-WOOD MATERIAL

A. Preservative-Treated-Wood Materials: Provide with water-repellent preservative treatment complying with AWPA N1 (dip, spray, flood, or vacuum-pressure treatment).

1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC), combined with a compatible EPA-registered insecticide.
2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.

B. Extent of Preservative-Treated Wood Materials: Treat interior architectural woodwork in contact with concrete or masonry.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

1. Fire-Retardant Treatment: Complying with requirements; provide where indicated.

B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.5 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:

a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
b. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.

a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be

installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion.

1. Shim as required with concealed shims.
2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWPA M4.

F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
3. For shop-finished items, use filler matching finish of items being installed.

H. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

3.3 REPAIR

A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.

B. Where not possible to repair, replace defective woodwork.

C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.

1. Fill nail holes with matching filler where exposed.
2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

D. Field Finish: See Section 099123 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.4 CLEANING

A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 06 48 23

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SECTION 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product, including high-pressure decorative laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
3. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.
3. Thermoset decorative panels.
4. Countertops.

D. Samples for Verification: For each type of casework, exposed-hardware, and countertop- material finish.

1. Plastic laminates, 12 by 12 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
2. Thermoset decorative panels, 12 by 12 inches, for each color, pattern, and surface finish, with edge banding on one edge.
3. Corner pieces as follows: 4.
    a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    b. Miter joints for standing trim.
5. Exposed cabinet hardware and accessories, one unit for each type and finish.
6. Countertop material, one unit for each type and finish.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program.

1.05 QUALITY ASSURANCE

A. Defective workmanship or damaged components shall be corrected, repaired, or replaced as requested by the Architect, without further cost to the Owner.

B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in- service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

C. Installer Qualifications: AWI's Quality Certification Program accredited participant.

D. Coordinate delivery of templates and other similar items from other trades necessary for the construction of required casework units.

E. Coordinate submittals with construction schedule ensuring timely review to avoid delays from installation.

F. Casework shall be manufactured and install to meet the requirements of the Florida Building Code 6TH Edition (2017) and the Florida Fire Prevention Code 6TH Edition (2017).

1.06 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in Field Conditions Article.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on ShopDrawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.09 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 PRODUCTS

2.01 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the latest edition of the Architectural Woodwork Institute (AWI) Quality Standards" for custom grade architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

B. Type of Construction: Frameless.

C. Cabinet, Door, and Drawer Front Interface Style: Full Overlay.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by AWI quality standard.

1. Colors, Patterns, and Finishes: Basis-of-Design Product and Manufacturer; as indicated on the Finish Schedule, subject to compliance with requirements other acceptable Manufacturers offering products which may be incorporated into the work are:

a. Formica Corporation.
b. Wilsonart

E. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Vertical Surfaces: Grade VGS.
3. Edges: Grade HGS or compatable PVC

F. Materials for Semiexposed Surfaces:

1. Horizontal and vertical surfaces: Grade CLS.

G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Drawer Sides and Backs: Solid-hardwood lumber.

2. Drawer Bottoms: White Birch or White Maple plywood; not less than 1/4-inch thick.

2.02 CABINET CONSTRUCTION

A. Support bases for base cabinets shall be 1-inch x 4-inch minimum pressure treated material. Cabinet Base: 4-inch high, 3/4 inch PT plywood. Provide additional center support for cabinets over 24 inches wide.

B. Base, Wall, and Tall Cabinet Boxes

1. Sides, bottom, and top: Constructed of glued and spline doweled 3/4 inch formaldehyde- free medium density fiberboard providing balanced construction, surfaced with cabinet liner CLS for semi- exposed and vertical grade laminate for exposed locations.
2. Wall cabinet bottoms and tops: Constructed of glued and spline doweled one inch thick formaldehyde-free medium density fiberboard, providing balanced construction surfaced with vertical grade laminate for exposed locations and cabinet liner CLS for semi- exposed locations.
3. Back panel: Constructed of minimum 1/4 inch prefinished tempered hard board, surfaced with CLS for semi-exposed and vertical grade laminate for exposed locations, inset and glued into sides, bottom, and top.
4. Exposed backs: Constructed of 3/4 inch formaldehyde-free medium density fiberboard, surfaced with vertical grade laminate of balanced construction for semi-exposed locations, glued and spline doweled, and mechanically attached if required.
5. Intermediate support rail: Minimum 3/4 inch formaldehyde-free medium density fiberboard, surfaced with vertical grade laminate of balanced construction, glued and doweled into cabinet sides.
6. Hanger rails: Two located at top and bottom of cabinet back, 3 on tall cabinets, locate at top, bottom, and center of 3/4 inch formaldehyde-free medium density fiberboard.

C. Fixed and Adjustable Shelves and Dividers

1. One inch formaldehyde-free plywood shelves
2. Exposed Locations: Vertical grade plastic laminate both sides. Color to match cabinet exterior plastic laminate or as selected by Architect.
3. Semi-exposed locations: VGS or CLS
4. Front and back leading edges shall be edged with flat 1mm thick high impact PVC edging to match shelf color.
5. Number of adjustable shelves provided, unless indicated otherwise on the Drawings or on the Schedule

a.	Low and tall cabinets	
b.	1 up to 24 inches	4 up to 72 inches
c.	2 up to 36 inches	5 up to 84 inches
d.	3 up to 60 inches	6 up to 96 inches
e.	Wall hung cabinets	
f.	0 up to 24 inches	2 up to 36 inches
g.	1 up to 30 inches	3 up to 40 inches

6. Adjustable dividers: 1/4 inch minimum thickness, prefinished tempered hardboard or plywood, smooth both faces, retained by molded plastic support clip.
7. Fixed dividers: Constructed of 3/4 inch medium density fiberboard, surfaced with vertical grade laminate, providing balanced construction; glued and spline doweled. PVC edged to match laminate or adjacent PVC edging.

D. Cabinet Doors

1. 3/4 inch medium density fiberboard.
2. High pressure plastic vertical grade laminate exterior and interior.
3. Doors 48 inches and less in length shall have 2 hinges per door; doors over 48 inches in length shall have 3 hinges per door.
4. Corners: Square with radiused edges, same as exposed laminate or compatible 3mm PVC edging.

E. Drawers

1. Manufacturers standard construction of minimum components listed below; glued and doweled or dovetail jointed; surfaced with vertical grade laminate of balanced construction. Bottoms surfaced to match drawer sides, inset and glued to four sides.

2. Drawer Face

a. Constructed of minimum 3/4-inch plywood, surfaced with VGS, screw attached to the drawer box.

1) Corners: To match doors.
2) Edging: To match doors.
3) Plastic Laminate: To match doors.

2.03 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

1. Hinges:

a. Fully adjustable European style with 180 degree opening angle. Commercial grade by Blum or Grass.
b. Doors 48 inches and over shall have 3 hinges per leaf
c. Finish: Powder coat baked-on enamel, color as selected by Architect.

2. Pulls:

a. 4-inch solid aluminum or stainless-steel wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel flush pulls. Provide two pulls for drawers more than 24 inches wide. Pull design shall comply with Americans with Disability Act (ADA).

3. Drawer Slides:

a. Combination metal and roller bearing drawer slides.
b. Pencil drawer's minimum 25 pound static load capacity, three quarter extension.
c. Box drawers up to 6" deep minimum 50 pound static load capacity, three quarter extension.
d. Deep drawers over 6" deep minimum 100 pound static load capacity, three quarter extension.
e. File drawers minimum 100 pound static load capacity, full extension.

4. Metal Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

a. At Locations Indicated

b. Finish to match other cabinet hardware.

5. Adjustable Shelf Supports: Metal, 2 pin, anti-lift, minimum 200 pounds capacity support clip. Support to accept either 3/4 inch or 1-inch thick shelf.
6. Catches: Magnetic type, adjusted for maximum 5-pound pull. Attach with screws and slotted for adjustment.
7. Locks. Five pin cam locks keyed to FSDB requirements, where directed by FSDB.

2.04 PLASTIC LAMINATE COUNTER TOPS

A. High Pressure Plastic Laminate: GP-50 grade, solid surface in locations indicated refer to section 12 36 61 “Solid Surface Countertops.”.
B. Plywood concealed members; solid formaldehyde-free plywood shall be 7 – Ply marine grade boat plywood or Baltic birch marine grade boat plywood.
C. Plywood shall incorporate Type II water resistant glue.
D. Horizontal work surfaces to be 1-1/2 inch thick unless otherwise noted.
E. Cut openings in countertops for sinks or other items required. Cut to size from template furnished by supplier of sinks or use the designated sinks on job.
F. Edging: Radius, with 3mm PVC.
G. Provide balancing sheet on opposite face.
H. Laminate tops shall be continuous in practical lengths. When requiring splice joints, use a combination of splines or dowels for alignment and Tite-Joint fasteners as required to make a uniform and gapless joint.
I. Backsplash and Endsplashes: Scribable, square set, color matching, and mechanically attached.

a. Backsplashes are required at locations where countertops abut walls where indicated on Drawings.
b. Edges of back and endsplashes shall be of square edge configuration.

J. Provide countertops for base cabinets and counter sections.

K. Sealants: Fully bed and seal splashes to tops and to other splashes with clear Sanitary Silicone Sealant Refer to Section 07 92 00 “Sealants.”

2.05 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.06 FABRICATION

A. General: Fabricate cabinets and shelves to dimensions, profiles, and details indicated.

1. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
2. Shop-cut openings to maximum extent possible to receive hardware, appliances,

electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

B. Veneer Core Substrate: As indicated.

C. Countertops: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrates.

D. Shelves: 3/4-inch plywood core with high pressure laminate all sides and edges. Maximum depth shall be 24 –inches. Maximum length shall be 36 inches. Finish all edges including top and bottom.

E. All visible surfaces of cabinetry not concealed shall be laminated.

PART 3 EXECUTION

3.01 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.02 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.03 INSTALLATION OF COUNTERTOPS

A. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.

B. Fastening:

1. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in hardness, and appearance.

C. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved.

D. Dress joints smooth, remove surface scratches, and clean entire surface.

3.04 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water- resistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.

C. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

D. Clean, lubricate, and adjust hardware.

END OF SECTION 06 41 16

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes cold-applied, emulsified-asphalt dampproofing applied to the following surfaces:

1. Exterior, below-grade surfaces of masonry foundation walls.
2. Exterior face of inner wythe masonry cavity walls, above grade that is not covered with Portland Cement plaster/stucco.

1.3 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

B. Section 04 22 00 - Concrete Unit Masonry

C. Section 07 27 26 Fluid Applied Membrane Air Barriers

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cold-Applied, Emulsified-Asphalt Dampproofing:
   a. Henry Company
   b. Sika
   c. Euclid Chemical
   d. W.R. Meadows

2.2 BITUMINOUS DAMPPROOFING

A. Odor Elimination: For interior and concealed-in-wall uses other than exterior face of inner wythe of cavity walls, provide dampproofing material warranted by manufacturer to be substantially odor free after drying for 24 hours under normal conditions.

B. Cold-Applied, Emulsified-Asphalt Dampproofing:

1. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Cut-Back-Asphalt Primer: ASTM D41/D41M.

E. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

F. ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

1. Thickness: Nominal 1/8 inch.

2. Adhesive: Rubber-based solvent type recommended in writing by waterproofing manufacturer for protection course type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.

B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.

D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

D. Where dampproofing interior face of above-grade, exterior concrete walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..

B. On Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or primer and one trowel coat at not less than 5 gal./100 sq. ft..

3.5 PROTECTION

A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 07 11 13

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modified bituminous sheet waterproofing.
2. Protection course.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, air barrier, and other termination conditions.

C. Samples: For each exposed product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For Installer.

B. Sample warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Waterproofing System: Obtain waterproofing materials, and protection course from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet Waterproofing: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Acceptable Manufacturers:
   a. GCP Applied Technologies - BITUTHENE® 3000 Membrane
   b. Henry Company - Blueskin® WP200
   c. Carlisle Coatings & Waterproofing - CCW MiraDRI 860/861

2. Physical Properties:

   a. Tensile Strength, Membrane: 250 psi (1.7 MPa) minimum; ASTM D412, Die C, modified.
   b. Ultimate Elongation: 300 percent minimum; ASTM D412, Die C, modified.
   c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
   d. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E154/E154M.
   e. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D570.
   f. Water Vapor Permeance: 0.05 perm (2.9 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
   g. Hydrostatic-Head Resistance: [200 ft. (60 m)] <Insert dimension> minimum; ASTM D5385/D5385M.

3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 ACCESSORIES FOR WATERPROOFING

A. Furnish accessory materials as recommended in writing by waterproofing manufacturer for intended use and compatibility with sheet waterproofing.

1. Furnish liquid-type accessory materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid solvent-borne primer as recommended in writing for substrate by sheet waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner as recommended in writing for substrate by sheet waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

2.4 PROTECTION COURSE

A. Protection Course, Extruded-Polystyrene Board Insulation, Unfaced: ASTM C578, Type X, 1 inch thick.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean, prepare, and treat substrates in accordance with manufacturer's written installation instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.2 INSTALLATION OF MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Install modified bituminous sheets in accordance with waterproofing manufacturer's written installation instructions.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

E. Seal edges of sheet waterproofing terminations with mastic.

F. Roll waterproofing membrane to firmly adhere to substrate. Roll seams and terminations.

G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.

H. Immediately install protection course with butted joints over waterproofing membrane.

3.3 PROTECTION, REPAIR, AND CLEANING

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Board insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Product test reports.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.60 lb/cu. ft. (26 kg/cu. m) with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
   1. Manufacturers:
      a. DiversiFoam Products.
      b. Dow Chemical Company.
      c. Owens Corning.
      d. Pactiv Building Products Division.

2.2 INSULATION FASTENERS

A. Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation 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. 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 CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between[**wall ties and other**] obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

END OF SECTION 07 21 00

SECTION 07 21 15 - SOUND ATTENUATION FIRE BATT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Mineral wool insulation for the following applications:
1. Interior partition insulation.
2. Concealed building insulation.
3. Sound attenuation insulation.

1.2 RELATED WORK

A. Refer to the following Sections for related work and insulation not included in this Section:
1. Division 07 Section – Membrane Roofing for roofing insulation.
2. Division 07 Section – Fire-Resistive Joint Systems.
3. Division 09 Section – Gypsum Board Assemblies for acoustic insulation.
4. Division 22 Section – Plumbing Insulation.
5. Division 23 Section – HVAC Insulation.

1.3 REFERENCES

A. ASTM International (ASTM):
1. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
2. ASTM C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
3. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
4. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
7. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 C.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data sheets including the following:
1. Product performance data.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain insulation from a single manufacturer.
B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface Burning Characteristics: ASTM E84
2. Combustion Characteristics: ASTM E139

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver insulation materials to Project site with original packaging unbroken and labeled with manufacturer's name, product brand name and type, and directions for storage.

B. Store materials in clean, dry area in manufacturer's unopened packaging until ready for installation and in accordance with manufacturer's instructions and temperature recommendations.

C. Handle and store insulation materials in a manner to avoid damaging materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Basis of Design: Johns Manville; P.O. Box 5108; Denver, Colorado 80217-5108. Toll Free: 800- 654-3103. Tel 303-978-2434. Web: www.jm.com.

2.2 SOUND ATTENUATION FIRE BATTS

A. Unfaced, Rock-Wool-Fiber Blanket Insulation: ASTM C665, Type I (blankets without membrane facing).
   1. Material: Inorganic fibers derived from basalt, with thermosetting resin binder.
   2. Emissions: GREENGUARD Indoor Air Quality Certified for low chemical emissions.
   3. Size: 6 inches thick, 16 inches wide, 48 inches long.
      Surface burning characteristics – ASTM E84: Maximum flame spread: 0, Maximum smoke spread: 0
   4. Combustion characteristics - ASTM E136 Noncombustible: Pass

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified.

3.2 INSTALLATION

A. Installation: Install rock-wool in strict accordance with manufacturer’s recommendations and written instructions, including the following:
   1. Install insulation in cavities formed by framing members to produce a snug friction fit between edges of insulation and adjoining framing members. Avoid excessive compression.
   2. If more than one length is required to fill a cavity, provide lengths that will fit tightly end-to-end.
   3. Walls with penetrations may require insulation to be carefully fit around outlets, junction boxes, and plumbing.
   4. Install in proper relationship with adjacent construction.

3.3 PROTECTION AND CLEANING

A. Protect materials from damage during installation and subsequent construction. Repair or replace damaged products before Substantial Completion.

END OF SECTION 07 21 15

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

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. Open-cell spray polyurethane foam.
   2. Intumescent coating for Spray Polyurethane Foam (SPF)

B. Related Requirements:

   1. Section 07 21 00 "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency, IAS International Accreditation Service.

C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer. Any repairs by an Icynene licensed contractor.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

C. Fire Resistance Characteristics: As determined by testing identical products (based on a 4 inch minimum thickness) according to ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

D. Fire Resistance Characteristics: As determined by testing identical products according to NFPA 285 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect spray polyurethane foam components as follows:

1. Component A and B: store between 60 degrees F and 90 degrees F .
2. Component B can be frozen but must be protected from overheating over 120 degree F and prolonged storage over 100 degree F.
3. Component B: mix thoroughly prior to use.
4. Components should be a matched set (system) as supplied by the manufacturer.
5. Use components within their labeled shelf-life.
6. Use components as supplied with no site alterations or additions.

1.7 WARRANTY

A. Refer to manufacturer's standard warranty terms (as applicable).

PART 2 - PRODUCTS

2.1 PERFORMANCE CHARACTERISTICS

A. Air Material Air Leakage Rate: Maximum material air leakage rate of less than 0.004 cfm/ft2 under a pressure differential of 0.3 in w.g. 1.6 psf per ASTM E 2178 or E 282.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Development Index: 450 or less.

C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Sustainability Requirements: Provide spray polyurethane foam insulation as follows:

1. Low Emitting: Insulation tested according to CA/DPH/EHLB/v1.1-2010.
2. Resistant to fungal growth as per ASTM C1338.
3. Containing no PBDE.

2.2 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 3.7 deg F x h x sq. ft./Btu at 75 deg F.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Icynene Inc.; Icynene Classic or comparable product by one of the following:

    a. BASF Corporation.
    b. Bayer Material Science (Bay Systems)

2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

B. Intumescent coating for Spray Polyurethane Foam: DC315 by International Fireproof Technology Inc. www.painttoprotect.com

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Do not apply insulation within 3-inches of heat emitting devices or where the temperature is in excess of 200 degrees F, as per ASTM C411 or in accordance with applicable codes.

E. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.

F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Thermal Protection: Protect installed spray polyurethane foam insulation with qualified thermal or ignition barrier per applicable building codes.

3.4 INSTALLATION OF AIR BARRIER COMPONENTS

A. Install air barrier components – membranes and sealants – as indicated on drawings for spray polyurethane foam as part of an air barrier system.

END OF SECTION 07 21 19

07 26 13 - UNDER-SLAB VAPOR BARRIER

PART 1 – GENERAL

1.1 SUMMARY

A. Products supplied under this section:
1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related sections:
1. Section 03 30 00 Cast-in-Place Concrete.

1.2 REFERENCES

A. ASTM International:
1. ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643-18a Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):
1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
2. ACI 302.1R-15 Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality control/assurance:
1. Summary of test results per paragraph 9.3 of ASTM E1745.
2. Manufacturer's samples and literature.
3. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
5. Certification of physical and chemical compatibility with adjacent materials.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Vapor barrier shall have all of the following qualities:
1. Maintain permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum
3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

B. Vapor barrier products:
1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
2. See Specification Section 01 25 00 Substitution Procedures prior to bid. **NO SUBSTITUTIONS AFTER BIDS.**

2.2 ACCESSORIES

A. Seams:
1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

B. Sealing Penetrations of Vapor barrier:
1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

C. Perimeter/edge seal:
1. Stego Crete Claw by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
3. StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

D. Penetration Prevention:
1. Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Beast Form Stake by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

E. Vapor Barrier-Safe Screed System
1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.
2. Beast Hook by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
1. Level and compact base material.

B. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION

A. Place vapor retarders on side of construction indicated on Drawings.

B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

E. Install vapor barrier in accordance ASTM E1643.
1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by

impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

a. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.

3. Overlap joints 6 inches and seal with manufacturer's seam tape.
4. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
5. For interior forming applications, avoid the use of non-permanent stakes driven through vapor barrier. Use Beast Form Stake and Beast Foot as a vapor barrier-safe forming system. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
7. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
8. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
10. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

3.3 PROTECTION

A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 07 26 13

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SECTION 07 27 26 - FLUID-APPLIED VAPOR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fluid-applied vapor barriers over concrete masonry units.
2. Fluid-applied membrane at openings.

1.2 PERFORMANCE REQUIREMENTS

A. General: Vapor barrier shall be capable of performing as a continuous vapor-barrier at the required mil thickness. 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 REFERENCED DOCUMENTS

A. ASTM Standards

1. C 297 Test Method for Tensile Strength of Flat Sandwich Constructions in Flatwise Plane.
2. C 1177 Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
3. D 522 Test Methods for Mandrell Bend Test of Attached Organic Coatings.
4. D 882 Test Methods for Tensile Properties of Thin Plastic Sheeting.
5. D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
6. D 3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
7. E 84 Test Method for Surface Burning Characteristics of Building Materials.
8. E 96 Test Methods for Water Vapor Transmission of Materials.
9. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
10. E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
11. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
12. E 1233 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.

B. Building Code Standards

1. Waterproofing/air barrier coat shall comply with the Florida Building Code.

C. American Plywood Association

1. E 30 Construction Guide.

D. Proprietary Specifications

1. 102250 Georgia-Pacific Corporation, “Dens Glass Gold Sheathing”.
2. AATCC (American Association of Textile Chemists and Colorists), Test Method 127, Water Resistance: Hydrostatic Pressure Test.

E. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

1. 2001 ASHRAE Handbook-Fundamentals.

1.4 DESIGN REQUIREMENTS

A. Deflection Criteria: Maximum allowable deflection normal to the plane of the wall: L/240.

B. Wind Load: Conform with the Florida Building Code requirements.

C. Moisture Control:

1. Minimize condensation within the assembly.
2. Drain water directly to the exterior where it is likely to penetrate components in the wall assembly (windows and doors, for example).
3. Provide flashing to direct water to the exterior in accordance with code requirements, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, intersections of lower walls with higher walls, and at the base of the wall.

D. Air Barrier Continuity: Provide continuous air barrier system of compatible air barrier components.

E. Mechanical Ventilation: Maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE (see 2001 ASHRAE Handbook-Fundamentals).

1.5 SUBMITTALS

A. Manufacturer’s specifications, details, warranty and product data.

B. Samples: Provide samples for approval by architect.

C. 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 vapor barrier.

D. Product certificates and test reports.

1. Certification of physical and chemical compatibility with adjacent materials.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying liquid applied vapor 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. Manufacturer Qualifications: A manufacturer of producing exterior wall vapor barrier materials for a minimum of 20 years.

C. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect coatings (pail products) from freezing temperatures and temperatures in excess of 90F (32C). Store away from direct sunlight.

1.8 PROJECT/SITE CONDITIONS

A. Maintain ambient and surface temperatures above 40F (4C) during application and drying period, minimum 24 hours after application of air and moisture barrier.

B. Provide supplementary heat for installation in temperatures less than 40F (4C) or if surface temperature is likely to fall below 40F (4C). (Note: surface temperature is lower than air temperature at night).

C. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.9 COORDINATION/SCHEDULING

A. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier.

B. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.

C. Provide sill flashing to direct water to the exterior before windows and doors are installed.

D. Install window and door head flashings immediately after windows and doors are installed.

E. Install diverter flashings wherever water can enter the assembly to direct water to the exterior.

1.10 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED VAPOR BARRIER

A. Fluid-Applied, Vapor-Barrier: Synthetic polymer membrane.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Synthetic Polymer Membrane:

1) Henry Company; Air-Bloc All Weather STPE.
2) GCP; Perm-A-Barrier – PAB VPL 50RS UV Stable.
3) Prosoco; R-Guard CAT 5.
4) Precora Corporation; XL-PERM ULTRA VP

2. Physical and Performance Properties:

a. Membrane Vapor Permeance: Not less than 10 perms; ASTM E 96.

2.2 FLUID-APPLIED MEMBRANE FLASHING

A. Manufacturer:
1. Henry Company
2. GCP
3. Prosoco
4. Precora Corporation

B. Liquid Applied Flexible Flashing:

1. Prosco, R-Guard FastFlash & Sure-Flash as a basis of design.

a. Reference Standards: ASTM E 547
b. Water Vapor Permanence: ASTM E 96 Wet Cup Method 6 perms.
c. Water Resistance: ASTM D 779 – 48 hours minimum.

2. Flexible flashing shall be applied to the bottom, top and sides of opening, extending 9 inches to side of opening, to desired coating thickness as recommended per manufacturer.

C. Fabric Counter-flashing:

1. Flashing Products; Sure Flash as a basis of design.

a. Reference Standards: ASTM E 547
b. Water Resistance: ASTM D 779 – 48 hours minimum.

2. While flexible flashing is still wet apply pre-creased fabric counter-flashing 3-inches about the bottom of opening and extending 9-inches to both sides.

D. Installation: R-Guard FastFlash shall be installed to the rough opening and over the fabric counter-flashing at sill and extending 9-inches onto the wall sheathing. After installation of window, Sure-Flash shall be applied to the interior side of the window. Follow manufacturer's written instructions. Flashing shall be incorporated with the liquid applied vapor barrier.

2.3 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. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

D. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

E. 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).

F. 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.

G. 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.

H. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 25 (medium-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.

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.

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. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. 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 VAPOR 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 a continuous unbroken vapor barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.

1. Vapor-Permeable Membrane Air Barrier: Uniform wet mil thickness of 10 mils in one coat.

E. Do not cover air barrier until it has been tested and inspected by Contractor’s testing agency.

F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

G. Air barrier membrane application shall be “pinhole free”.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements.

C. Remove and replace deficient air barrier components and retest as specified above.

3.5 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 until dry as recommended per manufacturer.

END OF SECTION 07 27 26

SECTION 07 41 13 16 - STANDING SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.
2. Metal flashing and trim coordinated with roofing.

B. Refer to Division 07 Sections “Sheet Metal Flashing and Trim” & ”Polyvinyl-chloride (PVC) Roofing.

1.2 PERFORMANCE REQUIREMENTS

A. Provide an engineered roofing system, capable of withstanding UL 580 wind uplift resistant, wind-borne debris, basic wind speed and conforming with The Florida Building Code. Provide for the most stringent requirements. All materials required to comply shall be in accordance with the Florida Product Approval System, Rule 9B-72 of the Florida Building Code.

B. Wind Speed Requirements: Roofing shall be engineered to withstand design pressures indicated on the Drawings.

1.3 SUBMITTALS

A. Product Data: For each type of underlayment product indicated.

B. Shop Drawings: Show layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points.

1. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, termination points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.

C. Coordination Drawings: Drawn to scale and coordinating sheet metal roofing installation with penetrations and roof-mounted items.

D. Samples: For each exposed finish.

E. Inspection Reports: Roofing contractor will provide a complete inspection report of the roof panel system to the Architect/Owner, performed by a representative of the manufacturer at the time of substantial completion.

F. Design Calculations: Submit shop drawings and design calculations signed, sealed and dated by a professional engineer registered in the State of Florida, indicating compliance

with specified performance criteria, including thermal movement and fastener pullout calculations. Indicate fasteners types and spacing.

G. Provide documentation that flashing and trim comply with ANSI/SPRI ES-1 if not covered elsewhere in the project documents.

1.4 QUALITY ASSURANCE

A. Roof panels shall be produced in continuous lengths from ridges to the eaves. Horizontal joints will NOT be allowed.

B. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.

C. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design and extent to that indicated for this Project and with a record of successful in-service performance for a minimum of five (5) years. An employer of workers trained and approved by manufacturer.

1. Installer's responsibilities include fabricating and installing metal roof panel assemblies.
2. Contractor is responsible for the fascia break metal, to match material and finish of roof panels.

D. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship and that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Failure include, but are not limited to, the following:

   a. Structural failures, including rupturing, cracking, or puncturing.
   b. Warranty shall not exclude salt-water environment.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 20 years from date of Substantial Completion.
3. Provide 20 years non-prorated weather tightness warranty.

B. Special Project Warranty: Submit roofing Installer's Warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for the following warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. The Florida Product Approval number shall be provided for the roof panel assembly, will be required for the Project to certify the roof panel assembly meets the applicable building code wind loads.

B. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
   1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils (0.76 to 1.0 mm) thick minimum, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

   1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
   2. Products: Subject to compliance with requirements, provide one of the following:

      a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
      b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
      c. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2.3 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weather-tight installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Berridge Manufacturing Company.
    b. Englert, Inc.
    c. MBCI; a division of NCI Group, Inc.
    d. PAC-CLAD; Petersen Aluminum Corporation, A Carlise company

2. Basis of Design: Tite-Loc Plus by Pac-Clad.

    a. Ribs: 2” High 18” O.C.

3. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

    a. Thickness: **0.050 inch**.
    b. Surface: Pencil Ribs
    c. Exterior Finish: Three-coat fluoropolymer.
    d. Color: As selected by Architect from manufacturer's full range including premium colors.

4. Metal Roof System Style

    a. Standing seam with mechanical 180-degree seaming.

5. Clip:

    a. Two-piece floating clip providing thermal or contraction UL-90 Rated or better.
    b. 0.062-inch- thick, stainless-steel sheet.

2.5 SUBSTRATE BOARDS

A. Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **5/8 inch.**

1. DensDeck by Georgia Pacific Gypsum LLC

2.6 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
2. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible

closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weather-right construction.

3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

B. Flashing and Trim: Formed from same material as roof panels. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

1. See Section 07 71 12 – MANUFACTURED FLASHING SYSTEMS for products to be used at specific locations.

2.7 FABRICATION

A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weather-tight and minimize noise from movements within panel assembly.

D. 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.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.8 FINISHES

A. Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

2.9 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, **Type II, Class 1, Grade 2** or glass-fiber mat facer on both major surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Atlas Roofing Corporation.
    b. Carlisle SynTec Incorporated.
    c. Dyplast Products.
    d. Firestone Building Products.
    e. GAF Materials Corporation.
    f. Hunter Panels.
    g. Insulfoam LLC; a Carlisle company.
    h. Johns Manville.
    i. Rmax, Inc.

B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

C. Provide minimum R-25 insulation rating over condition spaces per Building Code, latest adopted edition.

2.10 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied for compliance with requirements.

B. Verify that roof openings and penetrations are in place and set and braced.

C. Verify that wood nailers are in place, wrapped as required and secured and match thicknesses of insulation required.

3.2 PREPARATION

A. Lay out and nail blocking as required, before installation of sheet metal roofing. Space fasteners as required to resist design uplift, but not more than 18 inches (457 mm) o.c.

B. Install flashings and other sheet metal to comply with roofing manufacturer's recommendation.

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. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

C. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
2. Set each subsequent layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

3.4 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 UNDERLAYMENT INSTALLATION

A. Sheet Underlayment: Install sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof area as shown on the Roof Plan, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

B. Underlayment shall be laid in horizontal layers with joints lapped toward the eaves a minimum of 6", and well secured along laps and at ends as necessary to properly hold in place. All underlayment shall be preserved unbroken and whole.

C. Peel and Stick Underlayment shall lap all hips and ridges at least 12 to form double thickness and shall be lapped 6 over the metal of any valley or built-in gutters and shall be installed as required by the Standing Seam Panel Manufacturer to attain the desired 20 Year Weathertightness Warranty.

3.6 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

A. 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. 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.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Watertight Installation:

a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
c. 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 roof panel manufacturers; or, if not indicated, types recommended by metal roof 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 will be permanently watertight and weather resistant.

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 and weather-resistant 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 weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

H. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.8 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. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

1. Upon determination of responsibility, repair or replace damaged metal panels and trims to the satisfaction of the Architect and Owner.

PART 4 - INSTALLER'S WARRANTY

4.1 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____of_____, herein called the "Roofing Installer," has performed roofing and associated work ("work)" on the following project:

1. Owner:_____
2. Address:_____
3. Building Name/Type:_____
4. Address:_____
5. Area of Work:_____
6. Acceptance Date:_____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) or warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. Lightning;
    b. Peak gust wind speed exceeding _____ mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost

and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations. Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said changed affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known. Or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

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

1. Authorized Signature: _____.

2. Name: _____.

3. Title: _____.

END OF SECTION 07 41 13 16

SECTION 07 42 93 – 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:

1. Metal soffit panels.

B. Related Sections:

1. Section 074113.16 "Standing Seam Metal Roof Panels" for lap-seam metal roof 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.

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.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

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.

D. Provide documentation that flashing and trim comply with ANSI/SPRI ES-1 if not covered elsewhere in the project documents.

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.

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 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 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 E1592:

1. Wind Loads: As indicated on Drawings.
2. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

A. 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 inside laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels : Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. **BASIS OF DESIGN PRODUCT:** PAC-CLAD; Petersen Aluminum Corporation, A Carlise company .
   b. Berridge Manufacturing Company.
   c. Englert, Inc.
   d. MBCI; a division of NCI Group, Inc.

2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   a. Thickness: 0.040 inch.
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Three-coat fluoropolymer.
   d. Color: As selected by Architect from manufacturer's full range.
   e. Full Vented

3. Panel Coverage: 12 inches.
4. Panel Height: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Sub-framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel 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 wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; 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 C1311.

2.4 FABRICATION

A. 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. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. 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. Aluminum Panels and Accessories:
    1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.

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.
    2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

a. Verify that air- or water-resistive barriers 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. 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 C754 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 INSTALLATION

A. 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. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

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, 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.

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 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 with no joints allowed within 24 inches 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 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 07 42 93

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SECTION 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered polyvinyl-chloride (PVC) roofing system.
2. Roof insulation.
3. Substrate board
4. Walkways

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 PERFORMANCE REQUIREMENTS

A. Provide an engineered roofing system, capable of withstanding UL 580 wind uplift resistant, wind-borne debris, basic wind speed and conforming with The Florida Building Code. Provide for the most stringent requirements. All materials required to comply shall be in accordance with the Florida Product Approval System, Rule 9B-72 of the Florida Building Code.

B. Wind Speed Requirements: Roofing shall be engineered to withstand design pressures indicated on the Drawings.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site

1.5 ACTION SUBMITTALS

A. Product Data: For each type of underlayment product indicated.

B. Shop Drawings: Show layouts of sheet roofing, including plans, elevations, and keyed references to termination points.

C. Include details for forming, joining, and securing sheet roofing, including pattern of seams, termination points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.

D. Coordination Drawings: Drawn to scale and coordinating sheet roofing installation with penetrations and roof-mounted items.

E. Samples: For each exposed finish.

F. Inspection Reports: Roofing contractor will provide a complete inspection report of the roof panel system to the Architect/Owner, performed by a representative of the manufacturer at the time of substantial completion.

G. Design Calculations: Submit shop drawings and design calculations signed, sealed and dated by a professional engineer registered in the State of Florida, indicating compliance with specified performance criteria, including thermal movement and fastener pullout calculations. Indicate fasteners types and spacing.

1.6 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer’s instructions.

B. Installer Qualifications: Engage an experienced installer who has completed PVC Roof projects similar in material, design and extent to that indicated for this Project and with a record of successful in-service performance for a minimum of five (5) years. An employer of workers trained and approved by manufacturer.

1. Installer’s responsibilities include fabricating and installing PVC roof assemblies.
2. Contractor is responsible for the fascia break metal, to match material and finish of roof.

C. Preinstallation Conference: Conduct conference at Project site.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship and that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Failure include, but are not limited to, the following:

a. Structural failures, including rupturing, cracking, or puncturing.

b. Warranty shall not exclude salt-water environment.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 20 years from date of Substantial Completion.
3. Provide 20 years non-prorated weather tightness warranty.

B. Special Project Warranty: Submit roofing Installer's Warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for the following warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation, fasteners, for roofing system from manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:

1. Corner Uplift Pressure: See Structural Drawings
2. Perimeter Uplift Pressure: See Structural Drawings
3. Field-of-Roof Uplift Pressure: See Structural Drawings

D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 POLYVINYL-CHLORIDE (PVC) ROOFING

A. PVC Sheet: ASTM D 4434/D, Type II or III, fabric reinforced.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sarnafil G410 Feltback by Sika-Sarnafil Inc.

2. Available manufacturers:

a. Sika Sarnafil

100 Dan Road, Canton, MA 02021
+1 (888) 552-6769 www. https://usa.sika.com/

b. Carlisle Syntec Systems
P.O. Box 7000, Carlisle, PA, 17013–0925
+1 (800) 479-6832 www.carlisle-syntec.com

c. Siplast – Parasolo PVC Kee. Fleece-Back
14911 Quorum Drive, Suite 600
Dallas, Texas 75254
+1 (800) 922 8800 www.siplast.com

d. GAF
1 Campus Drive, Parsippany, NJ, 07054
+1 (877) 423-7663 www.gaf.com

3. Source Limitations: Obtain components for roofing system from roof membrane manufacturer.
4. Thickness: 60 mils nominal.
5. Exposed Face Color: White, EnergySmart, initial reflectivity of 0.83, initial emissivity 0.90, solar reflective index (SRI) of >104.

2.4 SUBSTRATE BOARDS

A. Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **5/8 inch**.

1. DensDeck by Georgia Pacific Gypsum LLC

2.5 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.

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Single-Ply Roof Membrane Adhesives: 250 g/L.
f. PVC Welding Compounds: 510 g/L.
g. Adhesive Primer for Plastic: 650 g/L
h. Single-Ply Roof Membrane Sealants: 450 g/L.
i. Nonmembrane Roof Sealants: 300 g/L.
j. Sealant Primers for Nonporous Substrates: 250 g/L.
k. Sealant Primers for Porous Substrates: 775 g/L.
l. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

C. 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.

D. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

E. Bonding Adhesive: Manufacturer's standard

F. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

G. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

H. Roof Edge Termination: Provide manufacturer's standard PVC coated metal edge system that is compatible with the roofing system for a complete warranty and weather protection. Match roof color.

2.6 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, **Type II, Class 1, Grade 2** or glass-fiber mat facer on both major surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atlas Roofing Corporation.
b. Carlisle SynTec Incorporated.
c. Dyplast Products.
d. Firestone Building Products.
e. GAF Materials Corporation.
f. Hunter Panels.
g. Insulfoam LLC; a Carlisle company.
h. Johns Manville.
i. Rmax, Inc.

B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

C. Provide minimum R-25 insulation rating over condition spaces per Building Code, latest adopted edition.

2.7 INSULATION ACCESSORIES

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof

insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.

1. Size: Approximately 36 inches wide.
2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.

1. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
2. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
    a. Test Frequency: One test probe per each 1000 sq. ft. (93 sq. m), or portion thereof, of roof deck, with not less than three tests probes.
    b. Submit test reports within 24 hours after performing tests.
3. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
4. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.

B. Verify that roof openings and penetrations are in place and set and braced.

C. Verify that wood nailers are in place, wrapped as required and secured and match thicknesses of insulation required.

D. **Do not proceed with installation until unsatisfactory conditions have been corrected. Once substrate has been accepted, Roofing Contractor takes full responsibility.**

3.2 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Install tapered insulation under area of roofing to conform to slopes indicated.

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

D. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
2. Set each subsequent layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

3.5 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

1. Install sheet according to ASTM D 5036.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.6 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 and mechanically anchor to substrate through termination bars.

3.7 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant

3.8 INSTALLATION OF WALKWAYS

A. Flexible Walkways:

1. Install flexible walkways at the following locations:
   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Locations indicated on Drawings.
   d. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch (76-mm) clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD TESTING

A. Contractor provide field testing per **ASTM C1153 Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging** to ensure a complete dry system. Submit report to Architect after testing prior to substantial completion.

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.

PART 4 - INSTALLER'S WARRANTY

4.1 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____of_____, herein called the "Roofing Installer," has performed roofing and associated work ("work)" on the following project:

1. Owner: _____
2. Address: _____
3. Building Name/Type: _____
4. Address: _____
5. Area of Work: _____
6. Acceptance Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) or warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period.

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. Lightning;
    b. Peak gust wind speed exceeding _____ mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost

and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations. Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said changed affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known. Or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

Submitted By:	_____	_____
	(GC Company Name)	*(Installer's Company Name)*
Signature:	_____	_____
	(Handwritten Signature)	*(Handwritten Signature)*
Signed By:	_____	_____
	(Type or Print Name)	*(Type or Print Name)*
Date:	_____	_____

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical roof eave fascia, approximately 48 inches (1200 mm) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.

C. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.

D. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.

2. Color: As selected by Architect from manufacturer's full range.

3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil

E. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M..

1. Surface: Manufacturer's standard clear acrylic coating on both sides.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
c. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal[**or manufactured item**].

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polysulfide polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED REGLETS

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing

indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Fry Reglet Corporation.
    b. Heckmann Building Products, Inc.
    c. Hickman Company, W. P.

2. Material: Aluminum 0.024 inch
3. Finish: Mill with manufacturer's standard color coating.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
6. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Provide per Specification **Section 07 71 12 Manufactured Flashing Systems.**

1. Accessories: Wire-ball downspout strainer and Gutter Splash Guards.

B. Downspouts: Provide per Specification **Section 07 71 12 Manufactured Flashing Systems.**

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

B. Valley Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

C. Drip Edges: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

D. Eave, and Rake Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

F. Flashing Receivers: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

G. Saddle Flashings:

1. Aluminum: 0.032 inch thick.

H. Roof-Penetration Flashing: Fabricate from the following materials:

1. Zinc: 0.032 inch thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Aluminum: **0.032 inch** thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not use torches for soldering.
2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. 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 apart. Install expansion-joint caps.
2. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
3. Slope gutters not less than 1/8-inch per foot.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate

installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Reglets: Shall be fasten, a maximum of 12-inches o.c., unless otherwise recommended per manufacturers written instructions.

1. Insert counterflashing into reglet to form tight fit. Secure in place with wedges at maximum of 12-inches o.c. Seal flashing into reglets with sealant.

C. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 62 00

SECTION 07 71 12 - MANUFACTURED FLASHING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish and install premanufactured flashing components per the drawings and specifications, including all clips, sealant, fasteners, and joining to make weathertight and watertight. Components and accessories shall be factory-fabricated and supplied by a specified Manufacturer.

B. Contractor shall utilize Manufacturer's technical representative to perform field measuring, takeoff, shop drawing development and order processing for all fascia components specified in this section.

C. Section Includes:
1. PREFORMED ALUMINUM COPINGS.
2. PREFORMED ALUMINUM FACIA
3. PREFORMED ALUMINUM GUTTER
4. PREFORMED ALUMINUM DOWNSPOUTS

1.2 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 07 41 13.16 - "Standing Seam Metal Roof Panels" for lap-seam metal roof panels.

C. Section 07 54 19 – “Polyvinyl-chloride (PVC) Roofing System” for single-ply roof membrane.

1.3 REFERENCE STANDARDS

A. SPRI (Single Ply Roofing Industry) (www.spri.org):
1. ANSI/SPRI/FM 4435/ES-1 – Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

B. National Roofing Contractors Association (NRCA), "Roofing and Waterproofing Manual", Fifth Edition, 2001 with 2003 Update.

C. Industry standards shall be 2003 Architectural Sheet Metal Manual as published by SMACNA.

D. Product approval: Coping shall have Notice of Approval by Florida Building Commission for statewide use.

1.4 PREINSTALLATION MEETINGS

A. Convene preinstallation meeting 2 weeks before start of installation of fascia system.

B. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, installer, and manufacturer's representative.

C. Review the Following:
   1. Materials.
   2. Examination of roof edge areas.
   3. Installation.
   4. Cleaning.
   5. Protection.
   6. Coordination with other Work, including roofing installation.

1.5 PERFORMANCE REQUIREMENTS

A. Provide an engineered roofing system, capable of withstanding UL 580 wind uplift resistant, wind-borne debris, basic wind speed and conforming with The Florida Building Code. Provide for the most stringent requirements. All materials required to comply shall be in accordance with the Florida Product Approval System, Rule 9B-72 of the Florida Building Code.

B. Wind Speed Requirements: Manufactured Flashing Systems shall be engineered to withstand design pressures indicated on the Drawings.

1.6 SUBMITTALS

A. Submit Florida Product Approvals, test reports, certifications, installation instructions and installation details for work described in this section, and intended for use on the project.

B. Products shall be manufactured in specified manufacturer's facilities. Products fabricated by installer or other fabricator will not be acceptable unless fabricator can demonstrate to Architect's satisfaction that products have been tested for resistance in accordance with Test Method RE-1 and RE-2 of ANSI/SPRI ES-1.

C. Product Data: Submit manufacturer's product data, including installation instructions.

D. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating dimensions, materials, components, fasteners, finish, and accessories.

E. Samples: Submit manufacturer's sample of each manufactured flashing system.
   1. Sample Size: Minimum 6" long.

F. Color Samples: Submit manufacturer's color samples of exterior covers, consisting of complete set of metal color chips representing manufacturer's full range of available colors including premium colors.

G. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

H. Manufacturer's Project References: Submit manufacturer's list of 10 successfully completed fascia system projects of similar size and scope to this Project, including project name and location, name of architect, and type and quantity of fascia systems furnished.

I. Certification:
1. Submit written certification that fluoropolymer coating complies with specified performance requirements.
2. Submit manufacturer's written certification that copings comply with requirements of ANSI/SPRI ES-1.
3. Roof membrane system manufacturer's written certification that premanufactured systems used are suitable for specified roof system warranty.

J. Warranty Documentation: Submit manufacturer's standard warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Manufacturer regularly engaged in the manufacturing of fascia systems of similar type to that specified for a minimum of 15 years.

B. Installer's Qualifications:
1. Installer regularly engaged in installation of fascia systems of similar type to that specified for a minimum of 5 years.
2. Use persons trained for installation of fascia systems.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:
1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area indoors.
4. Do not store materials directly on floor or ground.
5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.9 WARRANTY

A. Wind Warranty Period: Warranted in wind conditions up to 215 mph with a Lifetime wind warranty. Warranty specified for individual products below.

B. Warranty Period, Product: 5-year workmanship warranty covering replacement or repair of products that are defective in material or workmanship.

C. Warranty Period, Finish: Limited 30-year warranty for prefinished coil-coated steel and aluminum coated with Kynar 500 standard colors covering fade, chalk, and film integrity.

D. **Warranties begin at <u>Date of Substantial Completion</u>.**

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Metal-Era, LLC, 1600 Airport Road, Waukesha, Wisconsin 53188. Phone 800-558-2162. www.metalera.com info@metalera.com.

B. Acceptable Substitutions:
   1. W. P. Hickman Co., Permasnap Plus Series.
   2. Innovative Metal Company, Inc., PerformaEdge Coping.

C. Single Source: Furnish materials from single manufacturer.

2.2 COPING SYSTEM: “Perma-Tite Gold”.

1. Description:
   a. Snap-on coping with intermittent clips for capping parapet walls.
   b. Does not require exposed fasteners or joint sealants.

2. Performance Characteristics:
   a. Snap-on Coping Cap Sections: Capable of expanding and contracting freely, statically engaged onto mechanically secured clips.
   b. Snap-on Coping Cap Joints: Underlayed with concealed splices.
3. Approvals
   a. ANSI/SPRI/FM 4435 ES-1 .040” - 383 psf Vertical and 221 psf Horizontal, for .063” - 513 psf Vertical and 297 psf Horizontal.
   b. Florida Product Approval.
4. Intermittent Clips:
   a. Material: 16 ga. galvanized steel.
   b. Width: 12”
   c. Fastener Holes: Pre-Punched.
5. Concealed Splices:
   a. Material: Same as snap-on coping cap.
   b. Finish and Color: Same as snap-on coping cap.
   c. Width: 8”
   d. Sealant Strips: Factory-applied dual non-curing isocryl butyl sealant strips.
6. Finish: Prefinished Kynar

2.3 ALUMINUM GUTTER SYSTEM: “Seal-Tite Gold Industrial Gutter”

1. Gutter: “Seal-Tite Gold Industrial Gutter”
   a. Profile: Offset IGG-3
   b. Approvals:
      1) ANSI/SPRI GT-1-.040" - 136 psf vertical and 223 psf horizontal, for .063” - 108 psf vertical and 223 psf horizontal.
      2) Florida Product Approval.
   c. Gutter Size:
      1) Indicated on the Drawings.

d. Material: 0.040” aluminum
e. Formed Lengths: 12’-0”.
f. Fastener Holes: Pre-punched holes.
g. Concealed Splice Plates
1) Material: Same as gutters.
2) Finish and Color: Same as gutters.
3) Width: 6”.
h. Finish: Prefinished Kynar

2. Factory-Fabricated Accessories: Quicklock.
a. Miters.
b. End caps.
c. Expansion joints.
d. Special corners.
e. Material, Finish, and Color: Same as gutters.

3. Fasteners:
a. Suitable for intended substrate.
b. Provided by gutter manufacturer.

2.4 FASCIA SYSTEM: “Anchor-Tite Drip Edge”

1. Description:
a. Fascia with extruded aluminum anchor bar.
b. For standing seam metal roofing.
2. Face Size: 7.5”.
3. Roof Flange: Roof Pitch 2:12
4. Approvals:
a. ANSI/SPRI/FM 4435/ES-1 up to 98 psf Horizontal.
b. Florida Product Approval.
5. Extruded Anchor Bar:
a. Material: 0.040” Aluminum.
b. Thickness: Varies based on face height.
c. Extruded Lengths: 12’-0”.
d. Fastener Holes: Pre-Punched.
6. Anchor Bar Splices:
a. Material: Aluminum.
7. Lap Joints
a. Material: Same as exterior fascia covers.
b. Finish and Color: Same as exterior fascia covers.
c. Width: 1”.

2.5 DOWNSPOUTS: “Industrial Downspout”

A. Downspouts: “Industrial Downspout-Closed”

1. Material: 0.050” aluminum
2. Formed Lengths: 12’-0”.
3. Seams: Double Seam Lock.
4. Attachment Straps: Style 1
a. Width: 2”.

b. Straps per 12-Foot Downspout Length: 3.

5. Standard Elbows: Style A
   a. Material: Match downspouts.
   b. Finish: Match downspouts.
   c. Color: Match downspouts.
6. Offset Elbows:
   a. Material: 0.050” aluminum.
   b. Finish: Match downspouts.
   c. Color: Match downspouts.
7. Outlets: 0.040” aluminum.
8. Downspout Transitions: Eave Condition
   a. Material: Match downspouts.
   b. Finish: Match downspouts.
   c. Color: Match downspouts.
   d. Seams: [Quicklock]

2.6 WATERPROOF MEMBRANE: Waterproof membrane underlayment for use under preformed manufactured systems at locations where roofing membrane is not indicated to extend under the system:

A. Acceptable products:
   1. Carlisle Coatings and Waterproofing, WIP 300HT.
   2. Polyguard Products, Inc., Polyguard Deck Guard.
   3. W.R. Grace, Vycor Ultra.

B. Characteristics: Minimum 30 mil thickness, self-adhering rubberized asphalt sheet, 250 psi minimum tensile strength, 250% elongation. Provide primers, sealants and accessories required for a watertight installation.

2.7 FINISHES

A. Panels and Accessories:
   1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

B. Color: As selected by Architect from manufacturer's full range including premium colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine roof edge areas, including roofing and blocking, to receive fascia system.

B. Verify surfaces to support fascia system are clean, dry, straight, secure, and of proper dimensions.

C. Notify Architect, Owner's representative, and roofing installer of conditions that would adversely affect installation.

D. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install preformed manufactured system in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Fasteners:
1. Install fascia system using concealed fasteners in accordance with manufacturer's instructions.
2. Attach materials using aluminum or stainless-steel fasteners. Exposed fasteners shall match metal in finish.
3. Do not penetrate Horizontal roofing surface with fasteners.

C. Sealant: Apply continuous beads of sealant in accordance with manufacturer's instructions.

D. Thermal Expansion: Create gap between retainer sections and between fascia sections in accordance with manufacturer's instructions to allow for thermal expansion.

E. Review lengths of straight pieces of exterior covers before cutting to avoid creating relatively short sections adjacent to full-length sections.

F. Where roof membrane does not occur under pre-formed manufactured systems, install watertight membrane subflashing under pre-formed manufactured systems. Secure membrane subflashing under backup plates and continuous cleats.

G. Isolate preformed manufactured system from ACQ treated wood blocking or other galvanically incompatible material with appropriate material.

3.3 CLEANING

A. Clean fascia system promptly after installation in accordance with manufacturer's instructions.

B. Remove clear protective vinyl film.

C. Do not use harsh cleaning materials or methods that could damage finish.

3.4 PROTECTION

A. Protect installed fascia system to ensure that, except for normal weathering, fascia system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 71 12

SECTION 07 72 00 - ROOF ACCESSORIES

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. Preformed flashing sleeves.

B. Related Requirements:
   1. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

   1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Delegated-Design Submittal: For roof curbs and equipment supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

C. See Division One for 01 11 00 Product Evaluation and Approval.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind-Restraint Performance: As indicated on Drawings.

2.2 PREFORMED FLASHING SLEEVES

A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and slotted perforated metal collar.

1. Available Manufacturers:
   a. Roof Products and Systems (RPS) Hart & Cooley, LLC
   b. Thaler Metal Industries Ltd.
2. Metal: Aluminum sheet, 0.063 inch thick.
3. Diameter: As indicated on Drawings.
4. Finish: Manufacturer's standard.

B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.

1. Available Manufacturers:
   a. Roof Products and Systems (RPS) Hart & Cooley, LLC
   b. Thaler Metal Industries Ltd.
2. Metal: Aluminum sheet, 0.063 inch thick.
3. Height: 13 inches.
4. Diameter: As indicated on Drawings.
5. Finish: Manufacturer's standard.

2.3 METAL MATERIALS

A. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.

B. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

C. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Underlayment:
   1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

   1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Preformed Flashing-Sleeve and Flashing Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.

D. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780**/**A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

SECTION 07 72 33 - ROOF HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Provide factory-fabricated roof hatches for ladder access.
2. Provide factory-fabricated ladder safety posts.

1.2 PERFORMANCE REQUIREMENTS

A. Design and performance requirements:

1. Units must withstand the following positive/negative structural test pressure without damage when tested per ASTM E330: As indicated on Structural Drawings
2. Units shall be capable of resisting impact from windborne debris according to ASTM E1886, ASTM E1996, TAS 201, TAS 202 and TAS 203 per Florida Building Code:

1.3 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.

1.4 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.

1.5 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.

1.6 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: Precision Ladders, LLC, P. O. Box 2279; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com

2.2 ROOF HATCH

A. Furnish and install where indicated on plans metal roof hatch PH-(A) 2'-6" X 3'-0" . 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/m^2) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m^2) wind uplift.
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.

C. Cover:

1. Shall be 11 gauge (2.3mm) aluminum] with a 3” (76mm) beaded flange with formed reinf. Formed from 14 gauge galvanized steel of lockforming quality per ASTM A-525 with G90 coating (.090 Aluminum H-14 3003 on aluminum models).
2. Liner shall be 22 gauge galvanized steel with G90 coating (.040 Aluminum H-14 3003 on aluminum models).
3. Insulation between cover and liner to be 1" thick U.L. plain fiberglass 0.75# density.
4. Lid shall be reinforced as required with 11 ga. steel channel (.090 Aluminum H-14 3003 on aluminum models).
5. A one point cab lock is to be provided with a built-in inside handle on units with a length of 4' 6" or less. On units of greater length, a 2 point slam lock will be used.
6. Exterior of cover shall be devoid of hardware with the exception of the outside handle.
7. Outside handle shall be vinyl coated, steel T-handle.
8. Automatic hold-open device shall be formed from 3/16" steel flat bar and 1/2" diameter steel round stock with a vinyl grip.
9. Padlock provisions provided on both interior and exterior of unit.
10. Extruded rubber gasket shall be securely attached to the liner, thus providing a weather-tight seal.

D. Curb:

1. Formed from 14 gauge galvanized steel of lock forming quality per ASTM A-525 with G90 coating (.090 Aluminum H-14 3003 on aluminum models).
2. Sheathed with 1" of rigid fiber board insulation.
3. Height of 12" unless indicated otherwise on drawings.
4. 4" integral flange for securing to roof.
5. Hinges connecting curb to door shall be 1/8", 2 piece formed steel with 3/8" pivot pin.
6. Extruded rubber gasket within a 20 gauge extruded aluminum track shall be securely attached to the frame to make the unit weathertight.

E. PRESSURE CONTROL: Opening/closing assistance/resistance shall be provided with spring-loaded pressure intensifiers consisting of a telescoping tube; the top(outer) tube shall be 1 5/16",bottom (inner) tube shall be 1 1/2". Tubes shall be cadmium plated and chromate-sealed.

F. Hardware - Corrosion resistant hardware and fasteners is standard.

G. OPTIONAL ACCESSORIES

1. Precision Safety Access Handrail, mounted to outside corner of hatch curb, to provide a fixed hand hold assist when entering or exiting the hatch.
2. Precision Extend-A-Rail, to be mounted to hatch access ladder, to provide a retractable hand hold assist when entering or exiting the hatch.

H. FABRICATION - The hatch is completely fabricated ready for installation before shipment to the site.

I. Finishes: Factory finish shall be mill finish aluminum.

J. SOURCE QUALITY CONTROL - All products tested in factory for proper operation before shipment.

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.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION 07 72 33

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

        1) UL in its "Fire Resistance Directory."
        2) Intertek Group in its "Directory of Listed Building Products."
        3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Hilti, Inc.
2. 3M Fire Protection Products
3. NUCO Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

G. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

I. Firestopping materials are not approved for integration with the exterior building envelope.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

D. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 07 84 13

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction laboratory test reports.

C. Preconstruction field-adhesion-test reports.

D. Field-adhesion-test reports.

E. Sample warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. ASTM C 794 test in "Adhesion Testing" Subparagraph below is included as part of ASTM C 920 testing required for elastomeric sealants in this Section; retain below to require additional testing for specific substrates if required.

2. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

3. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.

4. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Verify available warranties and warranty periods for joint-sealant installation.

2. Warranty Period: Ten years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Verify available warranties and warranty periods for joint sealants.

2. Warranty Period: Twenty years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.

2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.

B. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.

b. GE Construction Sealants; Momentive Performance Materials Inc.

c. Pecora Corporation.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation-Construction Systems.

b. Pecora Corporation.

c. Sika Corporation.

d. Sonneborn Corporation.

B. Urethane, S, P, 25, T1, : Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation-Construction Systems.

b. Pecora Corporation.

c. Sherwin-WIlliams

d. Polymeric Systems, Inc.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Coordinate paragraphs in this article with "Joint-Sealant Schedule" Article.

B. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

C. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.

b. GE Construction Sealants; Momentive Performance Materials Inc.

D. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation-Construction Systems.

b. Pecora Corporation.

c. Sherwin-Williams Company (The).

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type 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.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. BASF Corporation-Construction Systems.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.

2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 5 tests for the first 500 feet of joint length for each kind of sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered

satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. For each joint sealant scheduled, retain corresponding product requirements in Part 2 that reference sealant standards, specify product properties and, if required, name manufacturers and products.

B. Joint sealants in paved roads, parking lots, walkways, and curbing are specified in Section 321373 "Concrete Paving Joint Sealants."

C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-#1.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.

b. Joints between plant-precast architectural concrete units.

c. Control and expansion joints in unit masonry.

d. Joints in dimension stone cladding.

e. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#2.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.

b. Tile control and expansion joints.

c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.

d. Joints on underside of plant-precast structural concrete beams and planks.

e. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-#3.

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.

b. Perimeter joints between interior wall surfaces and frames of interior doors windows.

c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#4.

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

b. Tile control and expansion joints where indicated.

c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Concealed mastics JS-#5.

1. Joint Locations:

a. Aluminum thresholds.

b. Sill plates.

c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

H. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-**#6**.

1. Joint Locations:

    a. Control and expansion joints in brick pavers.

    b. Isolation and contraction joints in cast-in-place concrete slabs.

    c. Joints between plant-precast architectural concrete paving units.

    d. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, P, 25, T1.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

END OF SECTION 07 92 00

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SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical joint sealants.

B. Related Requirements:

1. Section 07 92 00 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for non acoustical applications.

1.3 ACTION SUBMITTALS

A. Product Data: For each acoustical joint sealant.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of acoustical 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.

D. Acoustical-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

B. Sample Warranties: For special warranties.

1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.

2.2 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.

B. Acceptable Manufacturers:
1. GE Construction Sealants
2. Hilti, Inc
3. Tremco Inc
4. USG Corporation

C. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

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 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. 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 acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 19

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

1.5 QUALITY ASSURANCE

A. Standards: Comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI 100) latest addition, and as herein specified.

B. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

C. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

D. Provide Florida Product Approval Certification for exterior door assemblies. See SECTION 01 11 00 – PRODUCT EVALUATION AND APPROVAL".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements provide products by one of the following:

1. Ceco Door Products
2. Steelcraft
3. Curries
4. Hager

2.2 HOLLOW-METAL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. At all locations.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
    d. Edge Construction: Model 1, Full Flush
    e. Core: Manufacturer's standard insulation material.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
4. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
    b. Construction: Full profile welded.

5. Exposed Finish: Prime.

2.3 BORROWED LITES

A. Hollow-metal frames of metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 088000 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

    c. Compression Type: Not less than two anchors in each frame.

d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. 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 glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field 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 stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing 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 power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside 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 mineral-fiber insulation.
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 Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

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. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Engineered solid wood doors
2. Solid-core Doors with wood-veneer faces.
3. Factory machining for hardware.

1.2 SUBMITTALS

A. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details; location and extent of hardware blocking; mortises, holes, and cutouts; requirements for veneer matching; factory finishing; fire ratings; and other pertinent data.

B. Samples: For factory-finished doors.

C. Florida Product approval Number.

1.3 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect door during transit, storage and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer’s written instructions.

1. Individually package doors in cardboard cartons and wrap bundles of doors in plastic sheeting.

B. March each door with individual opening numbers used on Shop Drawings. Use removable tags of concealed markings.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet-work is complete and HVAC system is operating and will maintain temperature and relative humidity at occupancy level during the remainder of the construction period.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup or twist) more than 1/4-inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion.

a. 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following::

1. Algoma Hardwoods, Inc.
2. Eggers Industries, Inc.
3. Marshfield DoorSystems, Inc.
4. Oshkosh Architectural Door Co.
5. VT Industries, Inc.

2.2 DOOR CONSTRUCTION

A. Interior Solid-Core Doors for Opaque Finish

1. Grade: **Premium**.
2. Faces: **Any closed-grain hardwood of mill option**
3. Construction: **Five or seven plies, bonded**
4. WDMA I.S.1-A Performance Grade: **Heavy Duty**

2.3 FABRICATION

A. Fabricate doors in sizes indicated for Project-site fitting.

B. Job fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

D. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.4 FINISHING

A. Interior Doors: Factory applied natural clear sealer.

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.

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-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08 14 16

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SECTION 08 16 13 - FIBERGLASS DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Acrylic modified polyester (AMP) clad doors.

1.2 RELATED SECTIONS

A. Section 08100 Steel Doors and Frames: Fire-rated hollow metal frames.

B. Section 08700 - Hardware.

1.3 REFERENCES

A. ASTM-D256 – Standard Test Methods for Determining the Pendulum Impact Resistance of Plastics.
B. ASTM-D570 – Standard Test Method for Water Absorption of Plastics.
C. ASTM-D638 – Standard Test Method for Tensile Properties of Plastics.
D. ASTM-D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
E. ASTM-D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
F. ASTM D2794 – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
G. ASTM-E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
H. CAN / ULC S104 – Standard Method for Fire Tests of Door Assemblies.
I. UL 10B – Standard for Fire Tests of Door Assemblies.
J. UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies.
K. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
L. NFPA 252 – Fire Tests of Door Assemblies.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems and meet Florida Product Certification.

B. 90-Minute Full-Scale Vertical Fire Test of Doors, Positive Pressure: Complied with acceptance criteria for 90-minute rating per above reference standards.

1.5 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including description of materials, components, and installation.

C. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, components, and fabrication.

D. Samples:

1. Door: Submit manufacturer's sample of door showing face sheets, core, finish, and vision lites.
2. Color: Submit manufacturer's samples of standard colors of doors.

E. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

F. Manufacturer's Project References: Submit list of successfully completed projects, including project name and location, name of architect, and type and quantity of doors manufactured.

G. Operation and Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.

H. Warranty: Submit manufacturer's standard warranty.

1.02 QUALITY ASSURANCE

A. Manufacturer’s Qualifications.
1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years concurrent successful experience.
2. Door and frame components must be fabricated by same manufacturer.
3. Evidence of a documented complaint resolution quality management system.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Delivery.
1. Deliver materials to site in manufacturer’s original, unopened, containers and packaging.
2. Labels clearly identifying opening, door mark, and manufacturer.

B. Storage.
1. Store materials in a clean, dry area, indoors in accordance with manufacturer’s instructions.

C. Handling.
1. Protect materials and finish from damage during handling and installation.

1.04 WARRANTY

A. Warrant doors, frames, and factory installed hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.

B. Standard Period.
1. Ten years starting on date of shipment.

C. Limited lifetime
1. Covers failure of corner joinery, core deterioration, and delamination or bubbling of door skin and corrosion of all-fiberglass products while the door is in its specified application in its original installation.

D. Finish
   1. Painted AF-150 frames, AF-250 frames: 3 years.
   2. Painted FR doors: 3 years.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com . E-Mail info@special-lite.com.

2.02 FRP CLAD FIRE-RATED DOORS

A. Model: AF-220 doors fiberglass door and frame.

B. Door Opening Size: See Door Schedule.

C. Construction.
   1. Door Thickness.
      a. 1-3/4".
   2. Stiles.
      a. Single Swing.
         1. Hinge and lock stile, 2" minimum tectonite with Palusol P-100 Intumescent and 0.090" thick fiberglass edge painted to match door face.
      b. Standard Pairs.
         1. Hinge stile, 2" minimum tectonite with Palusol P-100 Intumescent and 0.090" thick fiberglass edge painted to match door face.
         2. Meeting edge, 3" minimum with Palusol P-100 Intumescent and 0.090" thick fiberglass edge painted to match door face.
   3. Rails.
      a. Top rail, 6" minimum tectonite with Palusol P-100 Intumescent and 0.090" thick fiberglass edge painted to match door face.
      b. Bottom rail, 4" minimum for single swing, 4-1/2" minimum for pairs tectonite with 0.090" thick fiberglass edge painted to match door face.
   4. Core.
      a. WSCP-412 proprietary mineral core.
      b. 1-1/2" nominal thickness.
      c. 18 pcf minimum density.
      d. 5 pieces maximum for single swing and 3 pieces per leaf maximum for standard pairs.
   5. Face Sheet.
      a. 0.090" thick, smooth fiberglass painted with two-part aliphatic polyurethane coating.
      b. Bonded to core with adhesive according to manufactures listing.
      c. Smooth
   6. Cutouts.
      a. Manufacture doors with cutouts for required vision lites per the manufactures listing.
   7. Hardware.
      a. Pre-machine doors in accordance with templates from specified hardware manufacturers.

b. Field apply factory supplied gaskets and seals, full width intumescent and smoke seal required at top of door, smoke seals required on both jambs.

2.03 FRAMING

A. Framing

1. FR-Series Framing
   a. Materials.
      1. ¼" thick, solid, pultruded, FRP profiles.
      2. No corrosive components or reinforcements.
      3. Solid tectonite filler.
      4. No steel or aluminum filler is allowed.
   b. Perimeter Frame Members.
      1. Factory fabricated.
      2. Integral 5/8" x 2-1/4" doorstop.
      3. Mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
      4. 5-3/4" jamb depth.
      5. 2" face on jambs.
      6. 2" face on header.
      7. Knocked down for field assembly.
   c. Anchors
      1. Factory furnished as specified by drawings.
      2. Drywall tuck available.

2.04 PERFORMANCE

A. Face Sheet.

1. Standard Interior and Exterior Class C 0.090" thick, smooth finish.
   a. Flexural Strength, ASTM-D790: 14 x 10^3 psi.
   b. Flexural Modulus, ASTM-D790: 0.4 x 10^6 psi.
   c. Tensile Strength, ASTM-D638: 6 x 10^3 psi.
   d. Tensile Modulus, ASTM-D638: 0.4 x 10^6 psi.
   e. Barcol Hardness, ASTM-D2583: 35.
   f. Izod Impact, ASTM-D256: 5.0 ft-lb/in.
   g. Chemical Resistance.
      1. Excellent Rating.
         a. Acetic Acid, Concentrated.
         b. Acetic Acid, 5%.
         c. Bleach Solution.
         d. Detergent Solution.
         e. Distilled Water.
         f. Ethyl Acetate.
         g. Formaldehyde.
         h. Heptane.
         i. Hydrochloric Acid, 10%.
         j. Hydrogen Peroxide, 3%.
         k. Isooctane.
         l. Lactic Acid, 10%.
   h. USDA/FSIS Requirements.
      1. FRP face sheet with surfaseal is a finished outer surface material that is rigid; durable; non-toxic; non-corrosive; moisture resistant; a light, solid color such as white; easily inspected; smooth or an easily cleaned texture.
      2. FRP face sheet with surfaseal does not contain any known carcinogen, mutagen, or teratogen classified as hazardous substances; heavy metals or toxic

substances; antimicrobials; pesticides or substances with pesticidal characteristics.

2.05 MATERIALS

A. Fiberglass.
   1. See 2.02.C.5.
B. Fasteners.
   1. All exposed fasteners will have a finish to match material being fastened.
   2. 410 stainless steel or other non-corrosive metal.
   3. Must be compatible with items being fastened.

2.06 FABRICATION

A. Factory Assembly.
   1. Door and frame components from the same manufacturer.
   2. Required size for door and frame units, shall be as indicated on the drawings.
   3. Maintain continuity of line and accurate relation of planes and angles.
   4. Secure attachments and support at mechanical joints with hairline fit at contact surfaces.
B. Shop Fabrication
   1. All shop fabrication to be completed in accordance with manufactures process work instructions.
   2. Quality control to be performed before leaving each department.

2.07 FINISHES

A. Door.
   1. FRP Face Sheets
      a. Painted.
         1. 2-part aliphatic polyurethane low VOC industrial coating, 5 mills thick, and gloss finish.
         2. Impact Resistance ASTM D2794 @ 5 mills thick, 140 in·lbs.
         3. Taber Abrasion, 1 kg load, 1000 cycles, CS-17 wheels, 60.2 mg.
         4. Color.
            a. White.
B. Frame
   1. Painted.
      1. Color.
         a. White.

2.08 ACCESSORIES

A. Vision Lites.
   1. Factory Glazing.
   2. Stainless Steel vison kit with 3/16” HT glass, clear. See section 08 80 00 Glazing for additional information.
   3. Size as indicated on the drawings.
   4. 60 to 90-minute rated doors.
      a. Maximum 704 in² in listed and labeled kit for positive pressure applications using listed glazing. Minimum 5” from top or edge of door to lite cutout and minimum 5” from latch cutout to lite cutout.
      b. Maximum 32” high.
      c. Maximum 22” wide.

d. Multiple lights are allowed when the sum of the areas does not exceed the tested area with the maximum length and width limitations.

5. 20 to 45-minute rate doors.
   a. Listed metal vison frames and listed glazing are limited to a maximum clear view area of 616 in² per lite with a maximum of 1232 in². Lite kits exceeding 100 in² void the temperature requirements per NFPA 80 unless temperature resistive glazing is used.

B. Louvers.
1. Listed and labeled louvers.
2. Maximum 100 in².
3. Must be below 40” from bottom of door.

C. Hardware.
1. All hardware must be listed and labeled for use in mineral core fire doors.
2. Pre-machine doors in accordance with templates from specified hardware manufactures and hardware schedule.
3. Factory install hardware.
4. EPT Units
   a. Allowed between top and middle hinge locations.
   b. 1/16” maximum clearance per side when installing EPT.
   c. Limited to maximum 60 min positive and neutral pressure applications.
   d. Intumescent caulk or strips are required on bottom, top, and side of EPT device.
5. Hardware Schedule.
   a. As specified in Section 08 71 00.
      1. Hinges Per NFPA 80, Table 6.4.3.1.

D. Wire Raceway
1. Single swing applications only.
2. 3/8” x 3/8” bore.
3. Maximum height of 40” from bottom edge of door.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.03 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Install doors plumb, level, square, true to line, and without warp or rack.

C. Anchor frames securely in place.

D. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by architect.
E. Set thresholds in bed of mastic and back seal.
F. Install exterior doors to be weathertight in closed position.
G. Install gaskets and seals to doors in accordance with manufacturer's instructions.
H. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
I. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.04 ADJUSTING

A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.05 CLEANING

A. Clean doors promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that would damage finish.

3.06 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 16 13

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SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include,

1. Acudor Products, Inc.
2. Babcock-Davis.
3. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
4. Karp Associates, Inc.
5. Larsen's Manufacturing Company.
6. Milcor Inc.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Exposed Flanges

1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling
3. Door Size: Sizes shall be as required to service equipment with no door size less than 12” x 12”. See drawings for additional locations shown or implied to access utilities as necessary.
4. Metallic-Coated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
5. Frame Material Same material, thickness, and finish as door
6. Hinges: Manufacturer's standard.
7. Hardware: Lock.

D. Fire-Rated, Flush Access Doors with Exposed Flanges

1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
2. Locations: Wall and ceiling.
3. Fire-Resistance Rating: Not less than that indicated.
4. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
6. Frame Material: Same material, thickness, and finish as door.
7. Hinges: Manufacturer's standard.
8. Hardware: Lock.

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

E. Frame Anchors: Same type as door face.

F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 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 in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors 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.

1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, 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.s.

2.5 FINISHES

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: 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.

D. Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING

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 08 31 13

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior, glazing is retained mechanically with gaskets on four sides.
2. Exterior manual-swing aluminum doors.
3. Exterior aluminum door frames.

B. Door hardware to be furnished and installed by aluminum framed entrance manufacturer.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferred to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
d. Glazing-to-glazing contact.
e. Noise or vibration created by wind and thermal and structural movements.
f. Loosening or weakening of fasteners, attachments, and other components.
g. Sealant failure.
h. Failure of operating units to function properly.

B. Structural Loads:

1. Wind Loads: As indicated on Structural Drawings.

C. Deflection of Framing Members Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches]

D. Structural-Test Performance: Systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity but not less than 10 seconds.

E. Windborne-Debris-Impact-Resistance-Test Performance: provide aluminum framed entrances and storefront that pass large missile –impact test and cyclic – pressure test according to the requirements of the Florida building Code.

F. Temperature Change (Range): Systems accommodate 120 deg F, ambient; 180 deg F, material surfaces.

G. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of systems of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

H. Water Penetration Under Static Pressure: Systems do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.

I. Thermal Performance:

1. Condensation Resistance Factor (CRF): A minimum of 59 when tested in accordance with AAMA 1503.1.
2. Thermal Transmittance U-Factor: 0.5 BTU/HR/FT²/°F or less when tested in accordance with NFRC 102.

J. Acoustical Performance: Acoustical Performance: When tested in accordance with ASTM E 1425:

1. Sound Transmission Class (STC) shall not be less than 39.
2. Outdoor–Indoor Transmission Class (OITC) shall not be less than 33.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples: For each exposed finish.

D. Product test reports.

E. Field quality-control test and inspection reports.

F. Florida Product Approval Numbers and data for each product.

G. Factory testing: Coordinate with Exterior Envelope Consultant for observation of those tests.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Acceptable to manufacturer and capable of preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build a full mockup as part of a wall assembly including all adjacent materials present. Include all flashing methods and techniques per all contract documents.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
3. Coordinate with owner’s exterior envelope consultant for additional steps and/or adjustments as directed.
4. Do not Proceed without an approved Mock up by the design team.

1.5 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals**,** metal finishes, and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage through fixed glazing and framing areas.
f. Failure of operating components to function properly.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for aluminum-framed systems is based on Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. Coral Industries, Inc.
2. YKK AP America Inc. (BASIS OF DESIGN)
3. Kawneer Company, Inc.
4. EFCO Corporation
5. US Aluminum

B. Basis of Design:

1. Exterior: YKK AP Series YHS 50 FL Impact Resistant Storefront System (Insulated Glazing)

2. Interior: YKK AP Series YES 40 FS SS Storefront System (Tempered Glazing)

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken framing members are one-piece members that are internally slotted at regular intervals.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

E. Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection. Providing full sill pans and dams.

F. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.5 DOORS

A. Doors: Manufacturer's standard glazed doors, for manual swing operation.

B. Basis of Design: YKK AP Series 35D Impact Resistant Storefront System (Insulated Glazing)

1. Door Construction: 1-3/4-inch overall thickness, 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; 3-1/2-inch nominal width.

3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide non-removable glazing stops on outside of door.

2.6 DOOR HARDWARE

A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.

1. Provide and Coordinate all materials as necessary per Access Control System's requirements.

2. Entrance Door Hardware Sets: Provide named manufacturers' products

3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more that 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.

B. Hinges:

1. Butt Hinges: Provide stainless steel hinges in quantities required for specific door heights and code compliance.

C. Manual Flush Bolts:

1. Provide one pair of stainless steel flush bolts in the inactive leaf of a pair doors as required to comply with large missile impact requirements.
2. Cylinders: As specified in Division 08 Section "Door Hardware."

D. Strikes: Provide strike with black plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

E. Operating Trim:

1. Provide Traditional Wire pull and Concealed Vertical Rod Push Pad where indicated.

F. Closers:

1. Concealed overhead door closer, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

G. Weather Stripping: Manufacturer's standard replaceable components.

H. Weather Sweeps: Manufacturer's standard exterior door bottom sweep with concealed fasteners on mounting strip.

I. Silencers: BHMA A156.16. Grade 1

J. Thresholds: A 4” wide raised thresholds beveled with a slope of not more that 1:2, with maximum Height of 1/2-inch.

K. Finishes to be selected from manufacturers full range.

L. Coordinate with Owner Access System.

2.7 DOOR HARDWARE SCHEDULE

A. Openings.

1. SEE ABOVE. ALL HARDWARE TO BE PART OF A TESTED ASSEMBLY TO COMPLY WITH HURRICANE CODE AND INDICATED DESIGN PRESSURE.

2.8 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

C. Provide external 1” wide simulated Muntins per drawings. Match frame material & finish.

2.9 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

F. Doors: Reinforce doors as required for installing hardware.

1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer's instructions. Openings shall be plumb, square and within allowable tolerances. The Architect/Engineer shall be notified of any conditions that jeopardize the integrity of the proposed wall/door framing system. Do not proceed until such conditions are corrected.

3.2 INSTALLATION

A. General:
1. See details for integration of exterior building envelope weather protection methods prior to installation. General Contractor coordination will all trades. Do not proceed without an approved field Mock up.
2. Fit joints to produce hairline joints free of burrs and distortion.
3. Rigidly secure non-movement joints.
4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
5. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

    a. Refer to Division 6 Section “Rough Carpentry”.

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and sill flashing with back and side dams set in a full sealant bed as specified in Division 07 Section "Joint Sealants" and to produce weather-tight installation. See details for further clarifications and direction.

E. Install components plumb and true in alignment with established lines and grades, without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weather-tight closure.
2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install insulation materials as specified in Division 07 Section "Thermal Insulation."

I. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weather-tight installation.

J. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

    a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
    b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.3 Field Quality Control

A. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been in-stalled, glazed, perimeter caulked and cured. Conduct

tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies must be corrected as part of the contract amount.

B. Testing: Testing shall be performed per AAMA 503 by a qualified independent testing agency. Refer to Division Testing Section for payment of testing and testing requirements.

1. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft2, which, ever is greater.
2. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 8 PSF.

C. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.

3.4 Protection and Cleaning

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Installed products are to be cleaned in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 08 41 13

SECTION 08 41 13.13 - FIRE-RATED ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Fire resistive, impact rated framing system for exterior applications.
   2. Applications of fire rated framing includes:
      a. Vision lites in fire rated doors, full vision fire rated doors, sidelites, borrowed lites, windows, transoms and transparent walls with fire and hurricane requirements as specified.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM E119: Methods for Fire Tests of Building Construction and Materials.
   2. ASTM E152: Methods of Fire Tests of Door Assemblies.
   3. ASTM E163: Methods for Fire Tests of Window Assemblies.
   4. ASTM E2074: Standard Test Method for Fire Tests of Door Assemblies, including Positive Pressure Testing of Side-hinged and Pivoted Swinging Door Assemblies.
   5. ASTM E2010-1: Standard Test for Positive Pressure of Fire Tests of Window Assemblies.
   6. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
   7. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
   8. ASTM E547: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
   9. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
   10. ASTM E1300: Standard Practice for Determining Load Resistance of Glass in Buildings.

B. Testing Application Standard (Miami Dade)
   1. TAS 201: Large and Small Missile Test Standards.
   2. TAS 202: Uniform Structural Load Standards.
   3. TAS 203: Uniform Cyclic Pressure Test Standards. These are the Test Standards.

C. AAMA
   1. AAMA 1302.5-76 and AAMA 1303.5-76 for Forced Entry Resistance.

D. National Fire Protection Association (NFPA):
   1. NFPA 80: Fire Doors and Windows.
   2. NFPA 251: Fire Tests of Building Construction and Materials.
   3. NFPA 252: Fire Tests of Door Assemblies.
   4. NFPA 257: Fire Tests of Window Assemblies.

E. Underwriters Laboratories, Inc. (UL):
   1. UL 9: Standard for Safety of Fire Tests of Window Assemblies.

2. UL 10B: Standard for Safety of Fire Tests of Door Assemblies.
3. UL 10C: Standard for Safety of Positive Pressure Fire Tests of Door Assemblies.
4. UL 263: Fire Tests of Building Construction and Materials.
5. UL 752-2005: Standard for Safety for Bullet-Resisting Equipment.

F. Standard Council of Canada (ULC):
1. ULC Standard CAN4-S101: Fire Tests of Building Construction and Materials.
2. ULC Standard CAN4-S104: Fire Tests of Door Assemblies.
3. ULC Standard CAN4-S106: Fire Tests of Window Assemblies.

E. Consumer Product Safety Commission (CPSC):
1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.

F. Glass Association of North America (GANA)
1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Fire Resistive Rating: must meet 45, 60, 90 or 120 minutes as specified.
2. Fire Resistive Wall Assembly Certifications: must meet 45-120 minute fire resistive wall assembly requirements tested in accordance with ASTM E119, NFPA 251, UL 263 and ULC-S101.
3. Fire Resistive Door Assembly Certifications: must meet 60-90 minute temperature rise door assembly requirements as tested in accordance with NFPA 252, UL 10B, UL 10C and CAN4S104. Must meet 250 degrees F/450 degrees F temperature rise door requirements.
4. Fire Protective Door Assembly Certifications: must meet 20-45 minute fire protective door assembly requirements shall be tested in accordance with NFPA 80, NFPA 252, ASTM E152, ASTM E2074, UL 10B, UL 10C and CAN4-S104.
5. Hurricane Rating: Must meet ASTM E283, ASTM E547, ASTM E330, ASTM E1300, TAS 201, TAS 202, TAS 203.
6. Must have UL Listing R25144 for wind resistant building components.
7. Must have Texas Department of Insurance Approvals CWSF-50 for Window/Walls and DR-798 for Single/Pair Doors. Must meet TDI's criteria for windborne debris in Inland I and Seaward zones.
8. Testing Laboratory: Fire test must be conducted by a nationally recognized independent testing laboratory.
9. Structural loads.
10. Thermal movements.
11. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
12. Dimensional tolerances of building frame and other adjacent construction.
13. Failure includes the following:
    a. Deflection exceeding specified limits.
    b. Thermal stresses transferred to building structure.

c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
d. Glazing-to-glazing contact.
e. Noise or vibration created by wind and thermal and structural movements.
f. Loosening or weakening of fasteners, attachments, and other components.
g. Sealant failure.
h. Failure of operating units to function properly.

B. Listings and Labels:
1. Fire rated framing system shall be under current follow-up service by a nationally recognized independent laboratory approved by OSHA and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

C. Structural Loads:

1. Wind Loads: As indicated on Structural Drawings.

D. Deflection of Framing Members Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches]

E. Structural-Test Performance: Systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity but not less than 10 seconds.

F. Windborne-Debris-Impact-Resistance-Test Performance: provide aluminum framed entrances and storefront that pass large missile –impact test and cyclic – pressure test according to the requirements of the Florida building Code.

G. Temperature Change (Range): Systems accommodate 120 deg F, ambient; 180 deg F, material surfaces.

H. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of systems of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

I. Water Penetration Under Static Pressure: Systems do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.

J. Thermal Performance:

1. Condensation Resistance Factor (CRF): A minimum of 59 when tested in accordance with AAMA 1503.1.
2. Thermal Transmittance U-Factor: 0.5 BTU/HR/FT²/°F or less when tested in accordance with NFRC 102. See Life Safety Code Data drawings for further information.

K. Acoustical Performance: Acoustical Performance: When tested in accordance with ASTM E 1425:

1. Sound Transmission Class (STC) shall not be less than 39.
2. Outdoor–Indoor Transmission Class (OITC) shall not be less than 33.

1.04 SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

B. Samples: For each exposed finish.

C. Product test reports.

D. Field quality-control test and inspection reports.

E. Florida Product Approval Numbers and data for each product.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Acceptable to manufacturer and capable of preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

1.05 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division1 Product Requirements Sections.

B. Ordering: Comply with manufacturer’s ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials to specified destinations in manufacturer's or distributor's packaging undamaged, complete with installation instructions.

D. Storage and Protection: Store off ground, under cover, protected from weather and construction activities and at temperature conditions recommended by manufacturer.

1.06 FABRICATION DIMENSIONS

A. Field Measurements: Verify actual measurements for openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.07 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals**,** metal finishes, and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage through fixed glazing and framing areas.
f. Failure of operating components to function properly.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Superlite II-XL 60 System as manufactured and distributed by SAFTI *FIRST*® Fire Rated Glazing Solutions.
1. Contact: 100 N Hill Drive, Suite 12, Brisbane, CA 94005; Telephone 888.653. 3333; email info@safti.com; Web site www.safti.com.

B. Fire resistive and hurricane rated glass and framing must be provided by a single-source, US manufacturer. Distributors of fire rated glass and framing are not to be considered as manufacturers. Materials for the project should be shipped together in the same shipment on the same truck.

C. Substitutions: No substitutions allowed.

2.02 MATERIALS – FRAMING

A. Fire resistive rated framing system up to 60 minutes.

Properties:

1. Frame profile: Wall frame profile will have 2.5” at the perimeter and 5” at the intermediates. Door frame profile: 5” vertical stile, 5” head and 10” bottom rail (can be modified with AHJ approval.
2. Internal framing: Internal tube steel framing shall conform to ASTM A501. Formed steel retainers shall be galvanized conforming to ASTM A527.
3. Insulation: The framing system shall insulate against the effects of fire, smoke and heat transfer from either side. The perimeter of the framing system to the rough opening shall be firmly packed with mineral wool fire stop insulation or appropriately rated intumescent sealant.
4. Fasteners: Type recommended by manufacturer. No exposed fasteners allowed.
5. Framing covers: Offered in standard and custom finishes including high performance fluoropolymer finished by PPG®, clear anodized, bronze anodized, black anodized, Decoral, any species of wood veneer, ornamental metal, and more.
6. Glazing accessories: The glazing material perimeter shall be separated from the perimeter framing system with approved flame retardant glazing tape. The SuperLite® glazing panel shall be caulked continuously around the edge to the tube steel frame utilizing neutral cure silicone. Silicone setting blocks recommended.
7. SAFTI *FIRST*® listing allows for doors by others.

2.03 MATERIALS – GLASS

A. Assemblies shall be glazed with SuperLite® II-XL with 9/16 in. Dupont Sentry Plus laminated glass. Dow Corning 995 to be used as the perimeter sealant when Florida Product Approval is required.

Properties:

1. Individual Lites shall be permanently identified with a listing mark.
2. Glazing material installed in “Hazardous Locations” (subject to human impact) shall be certified to meet the applicable requirements for fire rated assemblies referenced in ANSI Z97.1 Standard for Safety Glazing Materials Used In Buildings and/or CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
3. Temperature rise on the unexposed side of glazing material shall be limited to 250 degrees Fahrenheit when required.
4. Pressure glazing is allowed.

B. Logo: Each piece of fire rated glazing shall be labeled with a permanent logo.

2.03 FABRICATION

A. Form aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

F. Doors: Reinforce doors as required for installing hardware.

1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

G. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.04 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designing finishes.

B. Covers shall be chemically cleaned and pretreated; then, finished with:

1. High Performance Coraflon Fluoropolymer Finish by PPG®. Solid color to be selected from SAFTI's Standard Color Chart.

C. Protect finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

D. Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.05 DOOR HARDWARE FOR SINGLE AND PAIRED DOORS

A. Hardware shall be supplied with the fire door. Please call manufacturer for standard and custom hardware selections.
B. Coordinate with Owner's Access system.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer's instructions. Openings shall be plumb, square and within allowable tolerances. The Architect/Engineer shall be notified of any conditions that jeopardize the integrity of the proposed wall/door framing system. Do not proceed until such conditions are corrected.

3.02 INSTALLATION

A. Fire wall/door installation shall be by a licensed contractor and in strict accordance with the approved shop drawings.

B. General:
1. Fit joints to produce hairline joints free of burrs and distortion.
2. Rigidly secure non-movement joints.
3. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
4. Seal joints watertight, unless otherwise indicated.

C. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

a. Refer to Division 6 Section "Rough Carpentry".

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

E. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" and to produce weather-tight installation.

F. Install components plumb and true in alignment with established lines and grades, without warp or rack.

G. Entrances: Install to produce smooth operation and tight fit at contact points.

1. Exterior Entrances: Install to produce tight fit at weather stripping and weather-tight closure.

2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" and to produce weather-tight installation.

I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:
   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.03 CLEANING AND PROTECTION

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove such substances by method approved by manufacturer.

B. Wash glass on both faces not more than four days prior to date schedule for inspections intended to establish date of Substantial Completion. Wash glass by method recommended by glass manufacturer.

C. Remove temporary coverings and protection of adjacent work areas.

D. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 08 41 13 13

SECTION 08 71 00 - DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood, aluminum, and hollow metal doors.
B. Hardware for fire-rated doors.
C. Electrically operated and controlled hardware.
D. Lock cylinders for doors with balance of hardware specified in other sections.
E. Thresholds.
F. Smoke and draft control seals.
G. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

A. Section 079200 - Joint Sealants: Sealants for setting exterior door thresholds.
B. Section 080671 - Door Hardware Schedule: Schedule of door hardware sets.
C. Section 081113 - Hollow Metal Doors and Frames.
D. Section 081116 - Aluminum Doors and Frames.
E. Section 081213 - Hollow Metal Frames.
F. Section 081416 - Flush Wood Doors.
G. Section 084313 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.
H. Section 281000 - Access Control: Electronic access control devices.
I. Section 284600 - Fire Detection and Alarm: Electrical connection to release magnetic holders.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
C. BHMA A156.1 - Standard for Butts and Hinges; 2021.
D. BHMA A156.2 - Bored and Preassembled Locks and Latches; 2022.
E. BHMA A156.3 - Exit Devices; 2020.
F. BHMA A156.4 - Door Controls - Closers; 2019.
G. BHMA A156.5 - Cylinders and Input Devices for Locks; 2020.
H. BHMA A156.6 - Standard for Architectural Door Trim; 2021.
I. BHMA A156.7 - Template Hinge Dimensions; 2016.
J. BHMA A156.13 - Mortise Locks & Latches Series 1000; 2022.
K. BHMA A156.15 - Release Devices - Closer Holder, Electromagnetic and Electromechanical; 2021.
L. BHMA A156.16 - Auxiliary Hardware; 2018.
M. BHMA A156.18 - Materials and Finishes; 2020.
N. BHMA A156.21 - Thresholds; 2019.
O. BHMA A156.22 - Standard for Gasketing; 2021.
P. BHMA A156.26 - Standard for Continuous Hinges; 2021.

Q. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems; 2018.

R. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.

S. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.

T. DHI (H&S) - Sequence and Format for the Hardware Schedule; 2019.

U. DHI (KSN) - Keying Systems and Nomenclature; 2019.

V. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.

W. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; 1993; also in WDHS-1/WDHS-5 Series, 1996.

X. FLA (FBC-B) - Florida Building Code: Building (7th Edition); 2020.

Y. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Z. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

AA. ITS (DIR) - Directory of Listed Products; Current Edition.

BB. Miami (APD) - Approved Products Directory; Miami-Dade County; Current Edition.

CC. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests; 2019h.

DD. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

EE. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

FF. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

GG. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

HH. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

II. Storm Codes:
1. Miami-Dade.
2. Florida Building Code.

JJ. UL (DIR) - Online Certifications Directory; Current Edition.

KK. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

LL. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

MM. UL 1034 - Standard for Safety Burglary-Resistant Electrical Locking Mechanisms; Current Edition, Including All Revisions.

NN. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.

C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:
1. Architect.
2. Installer's Architectural Hardware Consultant (AHC).
3. Hardware Installer.
4. Owner's Security Consultant.

D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

E. Keying Requirements Meeting:
   1. Schedule meeting at project site prior to Contractor occupancy.
   2. Attendance Required:
      a. Contractor.
      b. Owner.
      c. Architect.
      d. Installer's Architectural Hardware Consultant (AHC).
   3. Agenda:
      a. Establish keying requirements.
      b. Verify locksets and locking hardware are functionally correct for project requirements.
      c. Verify that keying and programming complies with project requirements.
      d. Establish keying submittal schedule and update requirements.
   4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
      a. Access control requirements.
      b. Key control system requirements.
      c. Schematic diagram of preliminary key system.
      d. Flow of traffic and extent of security required.
   5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
   6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
   2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
      a. Submit in vertical format.
   3. List groups and suffixes in proper sequence.
   4. Include complete description for each door listed.
   5. Include manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
   6. Include account of abbreviations and symbols used in schedule.

D. Shop Drawings - Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
   1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
   2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
   3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Supplier's qualification statement.

I. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
   1. Include manufacturer's parts lists and templates.

J. Keying Schedule:
   1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

K. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

L. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

M. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016000 - Product Requirements, for additional provisions.
   2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least five years of documented experience.

D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
   1. Closers: Thirty years, minimum.
   2. Exit Devices: Three years, minimum.
   3. Locksets:
      a. Mechanical: Limited Lifetime, minimum.
      b. Electrified: Five Years. minimum
   4. Cylinders: Three Years, minimum.
   5. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Locks: Provide a lock for each door, unless it's indicated that lock is not required.
   1. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's Series. As indicated in hardware sets.
   2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
   3. Strikes:
      a. Finish: To match lock or latch.
      b. Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.
      c. Center Strike At Pairs of Doors: 7/8 inch (22.2 mm) lip.

D. Door Pulls and Push Plates:
   1. On glazed storefront doors, provide push bar width of door with pull handle unless otherwise indicated.

E. Closers:
   1. Provide door closer on each exterior door, unless otherwise indicated.
   2. Provide door closer on each fire-rated and smoke-rated door.
   3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

F. Thresholds:
   1. Exterior Applications: Provide at each exterior door, unless otherwise indicated.

G. Smoke and Draft Control Seals:
   1. Provide gasketing for smoke and draft control doors that complies with local codes, requirements of assemblies tested in accordance with UL 1784.
   2. Provide frame-applied intumescent gasketing on wood doors that are labeled as smoke and draft control doors, unless otherwise indicated.
   3. See Section 08 1416 for wood door to frame sealing system applied by door manufacturer.

H. Weatherstripping and Gasketing:
   1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
   2. Provide door bottom sweep on each exterior door, unless otherwise indicated.
   3. Fabricate as continuous gasketing, do not cut or notch gasketing material.

I. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

J. See Section 28 10 00 for additional access control system requirements.

K. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.

a. Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
   a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
   b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
6. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated or required per manufacturer's testing requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
   a. NFPA 101.
2. Accessibility: ADA Standards and ICC A117.1.
3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
5. Hardware for Smoke and Draft Control Doors: Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
   a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf (0.01524 cu m/sec/sq m) of door opening at 0.10 inch (24.9 Pa) of water for both ambient and elevated temperature tests.
      1) When required for acceptance by authorities having jurisdiction for code-mandated applications, test without an artificial bottom seal.
6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

A. Manufacturers: Conventional butt hinges.
1. BEST; dormakaba Group: www.bestaccess.com/#sle.
2. McKinney.
3. PBB Architectural.
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES

B. Properties:
1. Butt Hinges: As applicable to each item specified.
   a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
   b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
   c. Template screw hole locations.
   d. Bearing assembly installed after plating.
   e. Bearings: Exposed fully hardened bearings.
   f. Bearing Shells: Shapes consistent with barrels.
   g. Pins: Easily seated, non-rising pins.
      1) Fully plate hinge pins.

2) Non-Removable Pins: Slotted stainless steel screws.
h. UL 10C listed for fire-resistance-rated doors.
2. Continuous Hinges: As applicable to each item specified.
a. Geared Continuous Hinges: As applicable to each item specified.
1) Non-handed.
2) Anti-spinning through-fastener.
3) UL 10C listed for fire-resistance-rated doors.
(a) Metal Door Installation: Rated up to 90 minutes.
(b) Wood Door Installation: Rated up to 60 minutes.
4) Sufficient size to permit door to swing 180 degrees
b. Pin and Barrel Continuous Hinges: As applicable to each item specified.
1) Material: Fabricated from 14 gauge, 0.067 inch (1.7 mm) steel.
2) Slim barrel design.
3) Twin nylon self-lubricating bearings located between all knuckles except top and bottom.
4) Two stainless steel bearings top and bottom, to prevent sagging if nylon bearings degrade during a fire.

C. Sizes: See Door Hardware Schedule.
1. Hinge Widths: As required to clear surrounding trim.
2. Sufficient size to allow 180 degree swing of door.

D. Finishes: See Door Hardware Schedule.
1. Fully polish hinges; front, back, and barrel.

E. Grades:
1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
2. Comply with BHMA A156.18 Materials and Finishes.
3. Continuous Hinges: Comply with BHMA A156.26, Grade 1.

F. Pin-and-Barrel Hinges Standards Compliance: UL and ULC listed for fire-resistance rated 4 foot (1219 mm) by 8 foot (2438 mm) single doors and 8 foot (2438 mm) by 8 foot (2438 mm) pairs up to 3 hours.

G. Material: Base metal as indicated for each item by BHMA material and finish designation.

H. Types:
1. Butt Hinges: Include full mortise hinges.
2. Continuous Hinges: Include geared and pin and barrel hinges.

I. Options: As applicable to each item specified.
1. Provide electric power transfer (EPT) as listed in hardware sets.

J. Quantities:
1. Butt Hinges: Three (3) hinges per leaves up to 90 inches (2286 mm) in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.
a. Hinge weight and size unless otherwise indicated in hardware sets:
1) For doors up to 36 inches (914 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.134 inch (3.4 mm) and a minimum of 4-1/2 inches (114 mm) in height.
2) For doors from 36 inches (914 mm) wide up to 42 inches (1067 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.145 inch (3.7 mm) and a minimum of 4-1/2 inches (114 mm) in height.
3) For doors from 42 inches (1067 mm) wide up to 48 inches (1219 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
4) For doors greater than 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.

2. Continuous Hinges: One per door leaf.

K. Applications: At swinging doors.
1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

L. Products:
1. Butt Hinges:
a. Ball Bearing, Five (5) Knuckle.
2. Continuous Hinges:
a. Aluminum geared hinges.
b. Pin and barrel hinges.

2.04 BOLTS

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.
2. Burns.
3. Rockwood.

B. Properties:
1. Surface Bolts: Manufacturer's standard.
a. Bolt Throw: 3/4 inch (19 mm), minimum.
2. Flush Bolts:
a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
b. Manual Flush Bolts: Manually latching upon closing of door leaf.
1) Bolt Throw: 3/4 inch (19 mm), minimum.
3. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

C. Products:
1. Surface bolts.
2. Manual flush bolts: 3917-12.

2.05 EXIT DEVICES

A. Manufacturers:
1. Von Duprin.
2. Substitutions: Not permitted.

B. Properties:
1. Actuation: Full-length touchpad.
2. Chassis:
a. Construction: Investment cast steel, zinc dichromate plated.
b. Compatibility: Standard Stile doors.
3. Touchpads: 'T" style metal touchpads and rail assemblies with matching chassis covers end caps.
4. Latch Bolts: Stainless steel deadlocking with 3/4 inch (19 mm) projection using latch bolt.
5. Lever Design: Match project standard lockset trims.
6. Cylinder: Include where cylinder dogging or locking trim is indicated.
7. Strike as recommended by manufacturer for application indicated.
8. Sound dampening on touch bar.
9. Dogging:
a. Non-Fire-Resistance-Rated Devices: Hex key 1/4 inch (6 mm) hex key dogging.
b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
10. Touch bar assembly on wide style exit devices to have a 1/4 inch (6.3 mm) clearance to allow for vision frames.
11. All exposed exit device components to be of architectural metals and “true” architectural finishes.

12. Handing: Field-reversible.
13. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
    a. Provide through-bolts.
14. Vertical Latch Assemblies' Operation: Gravity, without use of springs.
    a. Latch Bolts: Stainless steel, with 1/2 inch (12.7 mm) throw.

C. Grades: Complying with BHMA A156.3, Grade 1.
   1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

D. Performance Requirements:
   1. Exterior Door Exit Devices in Hurricane-Strength Wind Areas:
      a. Devices included in Miami (APD) (Miami-Dade County Approved Products Directory).
      b. Complying with FLA (FBC-B) (Florida Building Code).

E. Standards Compliance:
   1. UL Listed for Panic and Fire for Class II Circuitry.
   2. Provide UL (DIR) listed exit device assemblies for fire-resistance-rated doors.
   3. Comply with UL 10C.

F. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

G. Options:
   1. Electrified Devices:
      a. Latchbolt Retraction: motorized latchbolt retraction.
   2. MLR: Motorized latch retraction.
   3. Electrified Device Voltage: 24VDC.
   4. Provide units meeting requirements of MIL-STD-810F, Method 506.4, Driving Rain Test and Method 509.4, Salt Fog Test.
      a. Provide an internally mounted switch that is to be used to signal other components.

H. Products:
   1. 98 Series Exit Devices

2.06 LOCK CYLINDERS

A. Manufacturers:
   1. BEST, dormakaba Group: www.bestaccess.com/#sle.
   2. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES

B. Properties:
   1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
      a. Provide cylinders from same manufacturer as locking device.
      b. Provide cams and/or tailpieces as required for locking devices.
      c. Provide cylinders with appropriate format interchangeable cores where indicated.

C. Grades:
   1. Standard Security Cylinders: Comply with BHMA A156.5.

D. Material:
   1. Manufacturer's standard corrosion-resistant brass alloy.

E. Types: As applicable to each item specified.
   1. Standard security small format interchangeable core (SFIC) type cylinders, with seven-pin, 1C - 7-pin cores.

F. Applications: At locations indicated in hardware sets, and as follows
   1. As required for items with locking devices provided by other sections, including at elevator controls and cabinets.

a. When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.

G. Products:
1. Rim/mortise: 12E & 1E Series

2.07 MORTISE LOCKS

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES

B. Properties:
1. Mechanical Locks: Manufacturer's standard.
a. Fitting modified ANSI A115.1 door preparation.
b. Door Thickness Coordination Fitting 1-3/4 inch (44 mm) to 2-1/4 inch (57 mm) thick doors.
c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
1) Latchbolt Throw: 3/4 inch (19 mm), minimum.
d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
e. Deadbolt: Hardened stainless steel.
1) Deadbolt Throw: 1 inch (25.4 mm), minimum.
f. Backset: 2-3/4 inch (70 mm).
g. Cylinders:
1) Cylinder Security: Use concealed internal setscrew accessible only by removing the core with the control key from the cylinder body for securing the cylinder to the lockset.
2) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
(a) Small format interchangeable.
h. Lever Trim:
1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
3) Spindle: Designed to prevent forced entry from attacking of lever.
4) Independent spring mechanism for each lever.
(a) Trim to be self-aligning and thru-bolted.
5) Handles: Made of forged or cast brass, bronze, or stainless steel construction. Levers that contain a hollow cavity are not acceptable.
6) Levers to operate a roller bearing spindle hub mechanism.
2. Electrified Locks: Same properties as standard locks, and as follows:
a. Voltage: 24 VDC.
b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.
c. Internal request-to-exit feature.

C. Finishes: See Door Hardware Schedule.
1. Core Faces: Match finish of lockset.

D. Grades:
1. Comply with BHMA A156.13, Grade 1, Security; Grade 2.

E. Options:
1. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

2. Temperature Control Module (TCM) at W-Series locks.
3. Regulatory Compliance: As required by authorities having jurisdiction the State in which the Project is located.
   a. Meeting requirements of Florida Building Code and approved for use in Miami-Dade County:
      1) Latch Throw: 9/16 inch (14 mm) as listed by Florida Building Code and Miami-Dade County at positive or negative pressure of 75 psf (3.6 kPa) for single doors.
      2) Latch Throw: 9/16 inch (14 mm) as listed by Florida Building Code and approved by Miami Dade County at positive or negative pressure of 60 psf (2.87 kPa) for single doors and 35 psf (1.67 kPa) for pairs of doors.
      3) Latch Throw: 3/4 inch (19 mm) as listed by Florida Building Code and approved by Miami Dade County at positive or negative pressure of 80 psf (3.8 kPa) for single doors and 50 psf (2.4 kPa) for pairs of doors.

F. Products: Mortise locks, including standard and electrified types.
   1. 40H.

2.08 DOOR PULLS AND PUSH PLATES

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.
   2. Burns.
   3. Rockwood.
   4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES .

B. Properties:
   1. Pull Type: Offset, unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products: See Hardware Sets.

2.09 DOOR PULLS AND PUSH BARS

A. Manufacturers:
   1. Trimco: www.trimcohardware.com/#sle.
   2. Burns.
   3. Rockwood.
   4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
   1. Bar Type: Bar set, unless otherwise indicated.
   2. Pulls and Handles:
      a. Tubular Bars:
         1) Bar Diameter: 1 inch (25 mm).
         2) Support Fitting Spacing: 13-3/4 inches (350 mm) center-to-center.
         3) Pull Projection off Door Face: 3-11/32 inches (85 mm).

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:
   1. Push and Pull Bars.

2.10 CLOSERS

A. Manufacturers:
   1. BEST, dormakaba Group www.bestaccess.com/#sle.
   2. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
   3. Norton.

4. LCN.
5. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
1. Surface Mounted Closers: Manufacturer's standard.
a. Construction:
1) Exterior: Single Piece Cast Iron.
2) Interior: Aluminum Alloy.
b. Maximum Projection from Face of Door: 2-7/16 inches (62 mm).
c. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
d. Pinion: Stainless steel.
e. Hydraulic Fluid: All-weather type.
f. Arm Assembly: Standard for product specified.
1) Material: Steel.
2) Include integral stop or spring-loaded stop feature, as specified in Door Hardware Schedule.
3) Parallel arm to be a heavy-duty rigid arm.
4) Where “IS” or “S-IS” arms are specified in hardware sets, if manufacturer does not offer this arm provide a regular arm mount closer in conjunction with a heavy-duty overhead stop equal to a dormakaba 900 Series.
g. Covers:
1) Type: Standard for product selected.
(a) Full.
2) Material: Plastic.
3) Finish: Painted.

C. Grades:
1. Closers: Comply with BHMA A156.4, Grade 1.
a. Underwriters Laboratories Compliance:
1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
b. Testing Standards Compliance: Meeting requirements of UL 10C for positive pressure.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

E. Types:
1. Rack-and-pinion, surface-mounted. 1-1/2 inches (38 mm) minimum bore.

F. Options:
1. Cushion limit stay.

G. Installation:
1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

H. Products:
1. Surface Mounted:
a. EHD9000
b. HD8000.

2.11 PROTECTION PLATES

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.
2. Burns.
3. Rockwood
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
1. Plates:
a. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1) Size: 10 inches (254 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.
b. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
1) Size: 6 inch (152 mm) high by 1-1/2 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.
c. Edges: Beveled, on four (4) unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: As indicated for each item by BHMA material and finish designation.
1. Metal Properties: Stainless steel.
a. Metal, Standard Duty: Thickness 0.050 inch (1.27 mm), minimum.

E. Installation:
1. Fasteners: Countersunk screw fasteners

F. Products: See Hardware Sets.

2.12 STOPS AND HOLDERS

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.
2. Burns.
3. Rockwood.
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. General: Provide overhead stop/holder when wall or floor stop is not feasible.

C. Grades:
1. Wall Bumpers and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.

E. Types:
1. Wall Bumpers: Bumper, concave, wall stop.
2. Floor Stops: Provide with bumper floor stop.

F. Installation:
1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

G. Products:
1. Wall Bumpers: 1270CV
2. Floor Stops: 1209HA
3. Bumper Floor Stops: 1211

2.13 ELECTROMAGNETIC DOOR HOLDERS

A. Manufacturers:
1. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.

2. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES .

B. Properties:
1. Holding Force, Standard Duty: 40 lbs-force (177 N), minimum.
2. Power Loss Status: Fail safe; door released to close.
3. Life Safety Interface: With fire detectors, fire-alarm system, and smoke detectors for fire-resistance-rated door assemblies.
4. Access Control Interface: With security system specified in Division 28.

C. Grades: Comply with BHMA A156.15.

D. Types: Wall mounted, single unit, standard duty, with strike plate attached to door.

E. Options: As applicable to each item specified.
1. Voltage: 24 VDC.

F. Products:
1. EM Series.

2.14 THRESHOLDS

A. Manufacturers:
1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Reese
3. Pemko
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
1. Threshold Surface: Fluted horizontal grooves across full width.

C. Grades: Thresholds: Comply with BHMA A156.21.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.
1. Threshold Assemblies: Aluminum.

E. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.
1. Saddle Thresholds: Without thermal break.

F. Products: See Hardware Sets.

2.15 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:
1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Reese
3. Pemko.
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
1. Weatherstripping Air Leakage Performance: Not exceeding 0.3 cfm/sq ft (_____ l/sq m) of door opening at 0.3 inches of water pressure differential for single doors, and 0.5 cfm/sq ft (_____ l/sq m) of door area at 0.3 inches of water pressure differential for double doors for gasketing other than smoke control, as tested according to ASTM E283/E283M; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
2. Adhesive-Backed Perimeter Gasketing: Slilicone gasket material applied to frame with self- adhesive.
3. Overlapping Astragals for Meeting Stiles: Silicone bulb gasket material held in place by aluminum housing and overlapping when doors are closed; mounted to face of meeting stile with screws; surface mounted to door.
4. Meeting Astragals for Meeting Stiles: Silicone bulb gasket material held in place by aluminum housing; mounted with screws.
   a. Mounting: Surface mounted on face of each door.

5. Door Sweeps: Silicone gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.
6. Automatic Door Bottoms: Sponge neoprene gasket material held in place by aluminum housing that automatically drops to form seal when door is closed.
   a. Mounting: Mortised into bottom of door.

C. Grades: Comply with BHMA A156.22.

D. Products:
1. Weatherstripping: See Door Hardware Schedule.
2. Smoke Seals: See Door Hardware Schedule.
3. Meeting Stile Seals: See Door Hardware Schedule.
4. Door Bottom Seals:
   a. Door Sweeps: See Door Hardware Schedule.
   b. Automatic Door Bottoms: See Door Hardware Schedule.

2.16 MISCELLANEOUS ITEMS

A. Manufacturers:
1. Trimco: www.trimcohardware.com/#sle.
2. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties:
1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   a. Single Door: Provide three on strike jamb of frame.
   b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
   c. Material: Rubber, gray color.

C. Products:
1. Silencers.

2.17 ELECTRIFIED HARDWARE

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
3. RCI; dormakaba Group: www.dormakaba.com/us-en/#sle.
4. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES .

B. Properties:
1. Door Position Switches: Recessed devices with magnetic contacts.
   a. Power Requirement: 50mA Max, 100 VDC.
   b. Switch Type: Using two Form C high reliability Rhodium-plated reed switches.
   c. SPDT configuration.
2. Power Supply Units: Manufacturer's standard.
   a. Regulatory Compliance:
      1) United States Compliance:
         (a) UL listed for Class II Output.
         (b) Comply with UL 294 Standards incorporating enhanced Access Control. communications capabilities.
   b. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
   c. Power: 24 VDC; field-selectable.
      1) Incoming Power Voltage: 120 VAC.
      2) Input circuit protection fuse.
   d. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.
   e. Auxiliary contacts for remote signaling.
   f. User-selectable time delay from 0 to 4 minutes.

g. Fire Alarm System Interface: Standard.
1) Fire alarm terminal with green LED indicating fire alarm activation.
2) Fire alarm terminal with green LED indicating power is available.
h. Output Distribution Board with indicator LEDs.
i. On/Off LED power indicator.
3. Power Transfers: Manufacturer's standard.
a. Mortised Type:
1) Stainless steel housing and flexible tube.
2) Capacity: Up to 5/16 inch (8 mm) diameter wire bundle (ten (10) 22-gauge Teflon coated wires).
3) Accommodate 120 degree door swing.
b. Mortised Type with Wires & Connectors:
1) Listed by UL and ULC.
2) Stainless steel housing and spring conduit.
3) Wire Harness: Pre-installed, twelve wire, equipped with ten (10) 24 gauge wires and two 18 gauge wires.
4) Accommodate 180 degree door swing.
5) Quick-Connect Plugs: Pre-installed.
4. Wire Harnesses: Of sufficient length, with quick connectors.
a. Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.

C. Products:
1. Door Position Switches:
a. 9540 Recessed Magnetic Contact/Door Position Switch.
2. Power Supplies:
a. PS 161-6
b. PS902 Series.
3. Power Transfers:
a. EPT-5 BEST.
4. Wire Harnesses:
a. BEST wire harnesses.

2.18 KEYS AND CORES

A. Manufacturers:
1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES.

B. Properties: Complying with guidelines of BHMA A156.28.
1. Provide small format interchangeable core.
2. Provide Patented CORMAX keys and cores.
3. Provide keying information in compliance with DHI (KSN) standards.
4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
5. Keying: Master keyed.
6. Include construction keying and control keying with removable core cylinders.
7. Do not make brass construction cores and construction control and operating keys a part of Owner's permanent keying system, nor furnish in the same keyway (or key section) as Owner, permanent keying system.
8. Key to new keying system.
9. Supply keys in following quantities:
a. Grand Master Keys: 1 each.
b. Master Keys: 4 each.
c. Construction Master Keys: 6 each.

d. Construction Keys: 15 each.
e. Construction Control Keys: 2 each.
f. Control Keys if New System: 2 each.

10. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
11. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
12. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
13. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

C. Products:
1. Patented:
a. CORMAX.

2.19 KEY CABINETS

A. Manufacturers:
1. Lund Equipment Company, Inc: www.lundkey.com/#sle.
2. Telkee: www.telkee.com/#sle.
3. Substitutions: See Section 01 25 00 - SUBSTITUTION PROCEDURES .

B. Properties:.
1. Key Management System: For each keyed lock on project, provide one set of consecutively numbered duplicate key tags with hanging hole and snap catch.
2. Security Key Tags: For each keyed lock on project, provide one set of matching key tags for permanent attachment to one key of each set.
3. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
4. Mounting: Wall surface mounted.
5. Capacity: Actual quantity of keys, plus 25 percent additional capacity.
6. Key cabinet lock to facility's keying system.

C. Finishes: Baked enamel, manufacturer's standard color.

D. Material: Sheet steel.

E. Products:
1. Lund: _____.
2. Telkee: _____.

2.20 FINISHES

A. Finishes: Identified in Hardware Sets.

B. Exceptions:
1. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
2. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Correct all defects prior to proceeding with installation.

C. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware using the manufacturer’s fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.

C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

D. Install hardware for smoke and draft control doors in accordance with NFPA 105.

E. Use templates provided by hardware item manufacturer.

F. Do not install surface mounted items until application of finishes to substrate are fully completed.

G. Wash down masonry walls and complete painting or staining of doors and frames.

H. Complete finish flooring prior to installation of thresholds.

I. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
   1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
   2. For Steel Doors and Frames: See Section 6549.
   3. For Steel Door Frames: See Section 081213.
   4. For Aluminum-Framed Storefront Doors and Frames: See Section 084313.
   5. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
   6. Flush Wood Doors: See Section 081416.
   7. Stile and Rail Wood Doors: See Section 081433.
   8. Mounting heights in compliance with ADA Standards:
      a. Locksets: 40-5/16 inch (1024 mm).
      b. Push Plates/Pull Bars: 42 inch (1067 mm).
      c. Deadlocks (Deadbolts): 48 inch (1219 mm).
      d. Exit Devices: 40-5/16 inch (1024 mm).
      e. Door Viewer: 43 inch (1092 mm); standard height 60 inch (1524 mm).

J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

K. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation activities.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

D. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

Manufacturer List

Code	Name
BE	Best Access Systems
BY	By Related Section
DM	Dorma Door Controls
MA	Markar
NA	National Guard
PE	Pemko
PR	BEST Precision Exit Devices
RC	RCI
SC	Schlage
SDCC	Security Door Controls
ST	BEST Hinges and Sliding
TR	Trimco
VO	Von Duprin

Option List

Code	Description
425-SNB)	SEX BOLTS (6)
B4E	BEVELED 4 EDGES - KICK PLATES
C	Quick Connect Wiring System
CON	Molex Electrical Connector
CSK	COUNTER SINKING OF KICK and MOP PLATES
EL-CEPT	Cast Pwr Transfer 12 Wire ElectroLynx
HW	Hurricane Wind-Only Sgl.
HW	Hurricane Wind-Only Sgl/Pr
QEL-L	Quiet Elec. Latch Retraction (LB & RX)
RQE	REQUEST TO EXIT
RX	REQUEST TO EXIT
VIN	Visual Indicator

Finish List

Code	Description
26D	Satin Chrome
32D	Satin Stainless Steel
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum
BEIGE	Beige
BLACK	Black
GREY	Grey
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

Hardware Sets

Set #1 - Entrance Alum

2	Continuous Hinge	FM-350 EL-CEPT	630	MA
1	Exit Device	HW 9827L x 996L-02-425-SNB CON QEL-L	US26D,	VO
1	Exit Device	HW RX 9827L-DT X 996L-DT 425-SNB CON	US26D,	VO
1	Rim Cylinder	12E-72 PATD	626	BE
1	Card Reader/Pin	By Security Contractor		BY
2	Closer	EHD9016 SPA90	689	BE
2	Floor Stop	1209HA	630	TR
1	Power Supply	PS902		VD
2	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
2	Wire Harness	CON-6P		SC
2	Wire Harness	CON-44		SC
2	Auto Door Bottom	320 N		NA
1	Saddle Threshold	425	AL	NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit. Weatherseals by door manufacturer.

Set #2 - Exterior Corridor

4	Hinges	FBB199 4.5" x 4.5" NRP	32D	ST
1	Exit Device	HW 99NL X 990NL425-SNB CON QEL-L	US26D	VO
1	Rim Cylinder	12E-72 PATD	626	BE
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	EHD9016 SPA90	689	BE
1	Floor Stop	1209HA	630	TR
1	Door Loop	EPT-2	630	PR
1	Power Supply	PS902		VD
1	Wire Harness	CON-6P		SC
1	Wire Harness	CON-44		SC
1	Position Switch	9540	BLACK	RC
1	Gasketing	5040 B x Head & Jambs		NA
1	Auto Door Bottom	320 N		NA
1	Saddle Threshold	425	AL	NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit. Weatherseals by door manufacturer.

Set #3 - Break Alum

1	Continuous Hinge	FM-350 EL-CEPT	630	MA
1	Exit Device	HW 99NL X 990NL425-SNB CON QEL-L	US26D	VO
1	Rim Cylinder	12E-72 PATD	626	BE
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	EHD9016 SPA90	689	BE
1	Floor Stop	1209HA	630	TR
1	Door Loop	EPT-2	630	PR
1	Power Supply	PS902		VD
1	Wire Harness	CON-6P		SC
1	Wire Harness	CON-44		SC
1	Position Switch	9540	BLACK	RC
1	Auto Door Bottom	320 N		NA
1	Saddle Threshold	425	AL	NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit. Weatherseals by door manufacturer.

Set #4 - Storage/Mech

8	Hinges	FBB199 4.5" x 4.5" NRP	32D	ST
2	Manual Flushbolt	3917-12	626	TR
2	Surface Bolt	3923	626	TR
1	Lockset	45H-7D79H PATD	626	BE
2	Closer	EHD9016 SPA90	689	BE
2	Floor Stop	1209HA	630	TR
1	Dust Proof Strike	3910	630	TR
1	Position Switch	9540	BLACK	RC
1	Gasketing	5040 B x Head & Jambs		NA
2	Auto Door Bottom	320 N		NA
1	Saddle Threshold	425	AL	NA

NOTE: Surface bolts mounted on inactive leaf top and bottom.

Set #5 - Electrical

4	Hinges	FBB199 4.5" x 4.5" NRP	32D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Core	1CDM	626	BE
1	Position Switch	9540	BLACK	RC
1	Gasketing	5040 B x Head & Jambs		NA
1	Auto Door Bottom	320 N		NA
1	Saddle Threshold	425	AL	NA

Set #101 - Stair UL

8	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
2	Exit Device	9927L-NL-F X 996L-02-NL CON QEL-L	US26D	VO
2	Exit Device	RX 9927DT X 990DT CON	US26D	VO

2	Rim Cylinder	12E-72 PATD	626	BE
2	Card Reader/Pin	By Security Contractor		BY
2	Closer	8916 SPA	689	DM
2	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
2	Wall Bumper	1270CV	626	TR
1	Power Supply	PS902		VD
2	Door Loop	EPT-2	630	PR
2	Position Switch	9540	BLACK	RC
2	Wire Harness	CON-6P		SC
2	Wire Harness	CON-44		SC
2	Gasketing	2525 x Head and Jambs		NA
1	Astragal Set	137 SA		NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #102 - Stair Alum

2	Continuous Hinge	FM_HD1		PE
2	Exit Device	9927L-BE-F 996L-02-BE 425-SNB	US26D	VO
2	Closer	EHD9016 SPA90	689	BE
2	Wall Bumper	1270CV	626	TR

Set #103 - Stair UL

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Exit Device	99NL-F x 990NL-R&V CON QEL-L	US26D	VO
1	Rim Cylinder	12E-72 PATD	626	BE
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	8916 SPA	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Power Supply	PS902		VD
1	Wire Harness	CON-6P		SC
1	Wire Harness	CON-44		SC
1	Position Switch	9540	BLACK	RC
1	Gasketing	2525 x Head and Jambs		NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #104 - Future Alum

2	Continuous Hinge	FM_HD1		PE
1	Exit Device	9927L-NL-F X 996L-02-NL CON QEL-L	US26D	VO
1	Exit Device	RX 9927DT X 990DT CON	US26D	VO
1	Rim Cylinder	12E-72 PATD	626	BE

2	Closer	8916 SPA	689	DM
2	Door Loop	EPT-2	630	PR
1	Power Supply	PS902		VD
2	Wire Harness	CON-6P		SC
2	Wire Harness	CON-44		SC
1	Position Switch	9540	BLACK	RC

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #105 - Corridor CR

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Harness	WH-32		ST
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Power Supply	PS161-6		PR
3	Silencer	1229A	GREY	TR

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #106 - Reception CR

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Power Supply	PS161-6		PR
1	Mini Console	DTMO-2		SDCC
	NOTE: Use one DTMO-2 for two doors			
1	Harness	WH-32		ST
1	Gasketing	2525 x Head and Jambs		NA

NOTE: One console to operate openings 104A and 104C. Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #107 - Recption CR

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Card Reader/Pin	By Security Contractor		BY
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Power Supply	PS161-6		PR
1	Mini Console	DTMO-1	BEIGE	SDCC
1	Harness	WH-32		ST
3	Silencer	1229A	GREY	TR

NOTE: Console to operate opening 104B. Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #108 - Lobby

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Closer	8916 AF89P	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Position Switch	9540	BLACK	RC
3	Silencer	1229A	GREY	TR

Set #109 - Corridor CR

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Closer	8916 AF89P	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Power Supply	PS161-6		PR
1	Harness	WH-32		ST
1	Gasketing	2525 x Head and Jambs		NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #110 - Offices CR

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Harness	WH-32		ST
1	Power Supply	PS161-6		PR
1	Gasketing	2525 x Head and Jambs		NA

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #111 - Lobby Alum CR

1	Continuous Hinge	FM-350 EL-CEPT	630	MA
1	Electromechanical Lock	45HW-7DEU79H PATD C RQE	626	BE
1	Closer	8916 AF89	689	DM
1	Wall Bumper	1270CV	626	TR
1	Door Loop	EPT-2	630	PR
1	Position Switch	9540	BLACK	RC
1	Harness	WH-6P		ST
1	Harness	WH-44		ST
1	Power Supply	PS161-6		PR
1	Harness	WH-32		ST

NOTE: Operation: Presenting valid door credential to card reader signals electric unlocking of the electrified exit device or electrified lockset. The door position switch monitors the status of each door held open or unauthorized entry. A request to exit switch internal to exit device or lockset and connected to intrusion detection system is activated upon exiting from the secure side signaling an authorized exit

Set #112 - Training Alum

2	Continuous Hinge	FM_HD1		PE
2	Manual Flushbolt	3917-12	626	TR
1	Dust Proof Strike	3910	630	TR
1	Lockset	45H-7R79H PATD	626	BE
2	Closer	8916 AF89	689	DM
2	Wall Bumper	1270CV	626	TR

Set #113 - Lobby Alum

2	Continuous Hinge	FM_HD1		PE
1	Manual Flushbolt	3917-12	626	TR
1	Dust Proof Strike	3910	630	TR
1	Lockset	45H-7R79H PATD	626	BE
2	Closer	8916 SPA	689	DM
2	Wall Bumper	1270CV	626	TR

Set #114 - Offices Alum

1	Continuous Hinge	FM_HD1		PE
1	Lockset	45H-7A79H PATD	626	BE
1	Wall Bumper	1270CV	626	TR

Set #115 - Offices

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7A79H PATD	626	BE
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #116 - Offices Alum (Exterior)

1	Continuous Hinge	FM_HD1		PE
1	Lockset	45H-779A WS VT PATD	626	BE
1	Closer	8916 SDS x BSHD x DP89	689	DM
1	Gasketing	Provided by Aluminum Door Mfr.		BY
1	Door Sweep	C627A		NA
1	Threshold	425		NA

Set #117 - Collector

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Lockset	45H-7A79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #118 - Conference

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #119 - Server Alum

1	Continuous Hinge	FM_HD1		PE
1	Door Pull	1738	630	TR
1	Closer	8916 AF89P	689	DM
1	Dome Stop	1211	626	TR

Set #120 - Test

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N79H	626	BE
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #121 - Recption UL

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7A79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #122 - Conference Alum

1	Continuous Hinge	FM_HD1		PE
1	Lockset	45H-7R79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Wall Bumper	1270CV	626	TR

Set #123 - GIS Alum

1	Continuous Hinge	FM_HD1		PE
1	Lockset	45H-7A79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Dome Stop	1211	626	TR

Set #124 - Restroom UL

4	Butt Hinge	FBB168 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N15H	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #125 - Staff Toilet

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7D79H PATD VIN	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Gasketing	2525 x Head and Jambs		NA
3	Silencer	1229A	GREY	TR

Set #126 - Janitor

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR

1	Mop Plate	KM050 6" x 1" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #127 - Janitor

4	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Closer	8916 AF89P	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #128 - Storage

8	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
2	Manual Flushbolt	3917-12	626	TR
1	Dust Proof Strike	3910	630	TR
1	Lockset	45H-7R79H PATD	626	BE
2	Closer	8916 AF89P	689	DM
2	Kick Plate	KO050 10" x 1" LDW B4E CSK	630	TR
2	Wall Bumper	1270CV	626	TR
2	Silencer	1229A	GREY	TR

Set #129 - Storage

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #130 - Break

NOTE: No hardware required.

Set #131 - Storage UL

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #132 - Electrical UL

4	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Closer	8916 SPA	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #133 - Restroom

4	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
1	Privacy Set	45H-0L79H	626	BE
1	Closer	8916 AF89P	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #134 - Toilet Glass

NOTE: Hardware complete by door manufacturer.

Set #135 - Electrical

4	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7D79H PATD	626	BE
1	Closer	8916 AF89P	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #136 - Storage

4	Butt Hinge	FBB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7R79H PATD	626	BE
1	Closer	8916 SPA	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #137 - Clerks

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7A79H PATD	626	BE
1	Closer	8916 AF89	689	DM
1	Kick Plate	KO1050 10" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CV	626	TR
1	Gasketing	2525 x Head and Jambs		NA

Set #138 - Storage

4	Butt Hinge	FBB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R79H PATD	626	BE
1	Wall Bumper	1270CV	626	TR
3	Silencer	1229A	GREY	TR

Set #139 – Interior Aluminum Pair - Lobby

2	Continuous Hinge	FM_HD1	ALUM	PE
2	Exit Device	3547A-L-F-LBR x 360L-02	626	VON
2	Rim Cylinder	12E-72 PATD	626	BE
1	Closer	8916 SDS x BSHD x DP89	689	DM
1	Gasketing	Provided by Aluminum Door Manufacturer		BY
1	Meeting Stile Astragal	Provided by Aluminum Door Manufacturer		BY

Opening List

Opening	Hdw Set	Opening Label	Door Type	Frame Type
102	1			
107	115			
108	114			
109	105			
110	114			
111	125			
112	125			
113	116			
114	115			
115	115			
116	129			
117	105			
119	119			
121	114			
122	125			
123	125			
124	125			
125	127			
126	135			
127	114			
129	114			
130	115			
131	118			
132	115			
133	133			
134	115			
135	115			
137	4			
139	132			
140	124			
141	124			
142	126			
152	2			
153	101			
202	122			
203	122			
204	115			
205	115			
206	122			
207	115			
209	115			
210	115			
211	105			

212	136
213	125
214	125
215	123
216	114
218	114
219	114
220	114
221	138
232	109
402	102
404	124
405	124
406	112
408	135
409	126
S2A	1
101A	1
101B	1
101C	1
103A	139
103B	108
103C	105
103D	105
104A	106
104B	107
104C	106
105A	120
105B	120
106A	121
106B	105
118A	3
118B	130
118C	130
128A	117
128B	117
133A	134
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END OF SECTION 08 71 00

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SECTION 08 80 00 - 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. Windows.
2. Doors.

1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. 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. Specified Design Wind Loads: As indicated on structural drawings, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."

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.
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 6.0 mm.
e. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
f. Windborne-Debris-Impact-Resistance-Test Performance: Provide glazing for aluminum-framed systems that pass large and small missile-impact tests and cyclic-pressure tests according to the requirements of The Florida Building Code.

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 laminated-glass lites, properties are based on products of construction indicated.

2. 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. Installer Qualifications: An experienced installer who has completed glazing similar in material, design and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Program.

B. 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.

C. Glazing for Fire-Rated Door and Window 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.

D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 for Category II materials.

E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."

1.6 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

B. 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.

C. Laminated Glass: ASTM C 1172, and complying with other requirements specified and with the following:

1. Interlayer: Manufacturer's standard of required thickness with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

D. Tempered Glass: ASTM C 1048, Kind FT (Fully tempered), Type I (Transparent flat glass) Quality-Q-1, Class I (clear).

1. Safety glazing locations are defined by the Florida Building Code for specific required locations.

E. Ceramic-Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."

1. Basis-of-Design Product: OldCastle i-GLASS
2. Glass: Clear float glass.
3. Ceramic Coating Color and Pattern: As selected by Architect from manufacturer's full range. White is the preferred color.
4. Minimum Thickness: ¼"
5. Coating Location: Second surface.
6. Visible Light Transmittance: 15 percent maximum.

2.2 FIRE-RATED GLAZING PRODUCTS

A. Fire-Protection Rating: 20 minute to 90 minute fire-rating, as indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Supplier: FireLite NT as supplied by Technical Glass Products, Kirkland, Washington ph: 1-800-426-0279, fax 1-800-451-9857, email: sales@fireglass.com, web site: www.fireglass.com.

1. Architect approved equal.

C. Properties:

1. Thickness: 3/16-inch.
2. Film: 3M Scotchshield Ultra Film or as required per manufacturer.
3. Fire Rating:

    a. 20-minutes.
    b. 45-minutes.
    c. 90-minutes.

4. Surface Finish: Standard (unpolished).

D. Labeling: Permanently label each piece of FireLite NT with the FireLite Logo and fire rating in sizes up to 3,325 sq. inch, and with the FireLite label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening on drawings, when tested in accordance with ASTM E2074, ASTM E2010, NFPA 252, NFPA 257, UL 9, UL 10B, UL 10C.

F. Glazing compound for Fire-Rated Glazing Materials:

1. Glazing Tape: Closed call polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

G. Setting Blocks: Neoprene, EPDM, or silicone: tested for compatibility with glazing compound, of 70 to 90 Shore A Hardness.

H. Cleaners, Primers and Sealers: Type recommended by manufacturer of glass and gaskets.

I. Fabrication:

1. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with system performance requirements.

J. Installation: Install per manufacturer’s recommendations.

2.3 GLAZING GASKETS

A. Lock-Strip Gaskets: Aluminum door and window manufacturer’s standard extrusions in size and shape required, fabricated into frames with molded corner units and lock stirps, complying with ASTM C 542, black.

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. Neoprene.
2. EPDM.

3. Silicone.
4. Thermoplastic polyolefin rubber.
5. 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, 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.

1. Single-Component Neutral-Curing Silicone Glazing Sealants:

a. Products:

1) Dow Corning Corporation; 790.
2) GE Silicones; SilPruf LM SCS2700.
3) GE Silicones; SilPruf SCS2000.
4) Pecora Corporation; 964.
5) Pecora Corporation; 890
6) Polymeric Systems Inc.; PSI-641.
7) Soneborn, Div. Of ChemRex, Inc.; Omniseal.
8) Tremco; Spectrem 3.

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

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 806.3 tape, for glazing applications in which tape is 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 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 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. Spacers for Dividend Lites: Insulating Glass to have aluminum between-glass spacers for a divided light appearance. Match frame finish. Provide 1” width unless noted elsewhere.

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

G. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type C (closed-cell material with a surface skin)), polyurethane foam rod, oversized 20 to 50 percent larger than joint width, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control glazing sealant depth and otherwise contribute to producing optimum sealant performance.

H. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 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.

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.

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.

3.3 GLASS SCHEDULE

A. Glass Type "**A**" – **Laminated Glass**: Impact rated laminated glazing as required per The Florida Building Code. Adjust glass thickness to meet design pressures as necessary.

1. Nominal Thickness: 19/32" thick laminated glass.
2. Exterior Lite: ¼" *Solarban® 70 Optiblue* #2 fully tempered float glass.
3. Inner layer: 0.090 Clear PVB.
4. Interior Lite: ¼" clear min. full tempered float glass clear.

B. Glass Type "**GL-1**" – **Insulated Laminated Glass**: All exterior glazing unless otherwise noted shall be Impact rated Insulated laminated glazing as required per The Florida Building Code. Adjust glass thickness to meet design pressures as necessary.

1. Nominal Thickness: 1 5/16-inch thick insulated laminated glass.
2. Exterior Lite: ¼" *Solarban® 70 Optiblue* #2 fully tempered float glass
3. Air Space: ½" air.
4. Interior Lite: ¼" fully tempered float glass
5. Inner layer: 0.090 Clear PVB.
6. Interior Lite: ¼" clear min. full tempered float glass clear.

C. Glass Type "**GL-2**": All interior non-fire rated locations unless noted elsewhere..

1. Nominal Thickness: 1/4 inch thick clear fully tempered float glass.

D. Glass Type "**GL-3**": All interior fire rated locations unless noted elsewhere.

1. Nominal Thickness: 1/4 inch thick clear fully tempered float glass with fire film.

E. Glass Type "**GL-3A**": All interior translucent fire rated locations unless noted elsewhere.

1. Nominal Thickness: 1/4 inch thick Ceramic-Coated Vision Glass fully tempered float glass with fire film.

F. Glass Type "**GL-4**" – **Insulated Laminated Translucent Glass**: All exterior glazing unless otherwise noted shall be Impact rated Insulated laminated glazing as required per The Florida Building Code. Adjust glass thickness to meet design pressures as necessary.

1. Nominal Thickness: 1 5/16-inch thick insulated laminated glass.
2. Exterior Lite: ¼" *Solarban® 70 Optiblue* #2 fully tempered float glass
3. Air Space: ½" air.
4. Interior Lite: ¼" Ceramic-Coated Vision Glass fully tempered float glass.
5. Inner layer: 0.090 Clear PVB.
6. Interior Lite: ¼" clear min. full tempered float glass clear.

END OF SECTION 08 80 00

SECTION 08 83 00 - MIRRORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Toilet Room Mirrors

1.2 RELATED SECTIONS

A. Section 08850 - Glazing Accessories.

1.3 REFERENCES

A. ASTM C 1036 - Standard Specification for Flat Glass.

B. ASTM C 1503 - Standard Specification for Silvered Flat Glass Mirror.

C. Glass Association of North America (GANA) Glazing Manual.

1.4 SUBMITTALS

A. Comply with Section 01330 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data, including performance characteristics and installation instructions.

C. Shop Drawings: Submit manufacturer's or fabricator's shop drawings, including plans, elevations, sections, and details, indicating glass dimensions, tolerances, types, thicknesses, and coatings.

D. Samples: Submit manufacturer's samples of each type and thickness.

E. Cleaning Instructions: Submit manufacturer's cleaning instructions.

F. Warranty: Submit manufacturer's standard 10-year warranty for mirror.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Minimum of 5 years experience manufacturing mirror.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver mirror in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage:
1. Store mirror in accordance with manufacturer's instructions.

C. Handling:
1. Handle mirror in accordance with manufacturer's instructions.

1.7 ADHESIVES
1. Mirror-Mastic

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Guardian Consolidated, 110 Jack Guynn Drive, Galax, Virginia 24333. Toll Free (800) 822-5599. Phone (276) 236-5196. Fax (276) 236-0570. Web Site www.guardian.com.

2.2 MIRROR GLASS

A. Toilet Room Mirrors:
1. Guardian Industries **UltraMirror – Laminated safety**
a. Type: **Rectangular**.
b. Thickness: 3/16 inch (5 mm
c. Dimensions: See interior elevations

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive mirror. Notify Architect of conditions that would adversely affect installation. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Verify areas to receive mirror are correct size and within tolerance.

B. Verify areas to receive mirror are clean and free of obstructions.

3.3 GLAZING

A. Install mirror in accordance with manufacturer's instructions, except where local codes or GANA Glazing Manual indicate more stringent requirements.

3.4 FIELD QUALITY CONTROL

A. Verify mirror is free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

3.5 CLEANING

A. Clean mirror promptly after installation in accordance with manufacturer's instructions.

B. Remove labels from mirror surface.

C. Do not use harsh cleaning materials or methods that would damage mirror.

3.6 PROTECTION

A. Protect installed mirror from damage during construction.

B. Protect installed mirror from contact with contaminating substances resulting from construction operations.

C. Remove and replace mirror that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

END OF SECTION 08 83 10

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SECTION 08 90 00 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fixed metal louvers.

B. See Division 23 Sections for louvers that are a part of mechanical equipment.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
2. Comply with Florida Building Code & Wind Loads.

C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Samples: For each type of metal finish required.

D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Product Test Reports: Based on tests performed according to AMCA 500-L.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify louver openings by field measurements before fabrication and indicated measurements of Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating louvers without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material: 6063-T5 aluminum alloy, meeting ASTM B221, 0.081" minimum thickness.

B. Fasteners: Use types and sizes to suit unit installation conditions.

1. For color-finished louvers, use fasteners with heads that match color of louvers.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Fasteners: Stainless steel of type required to attach to substrates encountered.

2.2 FABRICATION, GENERAL

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED LOUVERS

A. Storm-Resistant Louver:

1. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow United Industries; a division of Mestek Inc.
    b. Ruskin Company; Tompkins PLC.
    c. Greenheck
    d. Industrial Louvers, Inc.

2. Louver Depth: 4 inches minimum.
3. Construction: Welded.
4. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.52 mm) for blades and 0.080 inch (2.03 mm) for frames.
5. Blade design: Fixed, drainable, 45 degrees.
6. Free area: 50%.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.

C. Louver Screening:

1. Insect Screens: Aluminum 18-16 mesh, mill finish, .011 inch (0.3 mm) wire.

2.5 FINISH

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A 780.

B. Finish on exposed aluminum components::

1. Three coat, shop-applied, baked-on, fluoropolymer coating system based on minimum 70% Arkema Group, Kynar 500 or Solvay Solexis, Inc., Hylar 5000 resin (Polyvinylidene fluoride, PVDF), formulated by a licensed manufacturer and applied by manufacturer's approved applicator to meet AAMA 2605.
2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Install louvers in accord with approved shop drawings, product data, and louver manufacturer's NOA in prepared openings.

C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

F. Protect nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

G. Caulk around perimeter of louver to provide a weather and water tight installation.

END OF SECTION 08 90 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

B. 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.

2.2 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: 0.033 inch
2. Depth: As indicated on Drawings

B. Slip-Type Head Joints: Where indicated, provide the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following:

1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) MBA Building Supplies; [Steel Network Inc. (The); .
3) Superior Metal Trim; Superior Flex Track System (SFT).

C. Firestop Tracks: Manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, the following:

a. Fire Trak Corp.; Fire Trak System.
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness 0.027 inch.

E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches.

2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.033 inch.

2. Depth: 7/8 inch.

G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1 1/2inch.

2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.

3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches wall attachment flange of 7/8 inch minimum uncoated-metal thickness of 0.018 inchand depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E 488.
2. Powder-Actuated Fasteners: Capable of sustaining, a load equal to 10 times that imposed as determined by ASTM E 1190.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inchin diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inchby length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inchand minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inchuncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.

2.4 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide asphalt saturated organic felt or foam gasket.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Furring Members:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
3. Do not attach hangers to steel roof deck.
4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Impact-resistant gypsum board.
3. Exterior gypsum board
4. Tile backing panels.
5. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each texture finish indicated on same backing indicated for Work.

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory 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. 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 wall coverings, 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.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. Basis-of-Design Product: The design for each type of gypsum board and related products is based on Georgia-Pacific Gypsum products named. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Lafarge North America Inc.
4. National Gypsum Company.
5. PABCO Gypsum.
6. Temple-Inland.
7. USG Corporation.

B. Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Acceptable product: G-P Gypsum Corporation, “DensArmor Plus High - Performance Interior Panel”
2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 EXTERIOR GYPSUM BOARD

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum; “DensGlass Sheathing" or a comparable product by one of the following:

   a. CertainTeed Corp.
   b. National Gypsum Company.
   c. USG Corporation.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

B. Glass-Mat Gypsum Roof Protection Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum; “DensDeck StormX Roof Board" www.densdeckstormx.com or a comparable product by one of the following:

   a. CertainTeed Corp.
   b. National Gypsum Company.
   c. USG Corporation.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
4. UL 1256 Classification
5. FM Class 1

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum; “DensShield Tile Backer” or a comparable product by one of the following:

   a. CertainTeed Corp.

2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 IMPACT-RESISTANT PANELS

A. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested in accordance with ASTM C1629/C1629M.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific Gypsum; “DensArmour Plus Impact-Resistant Panels” or a comparable product by one of the following:

   a. CertainTeed Corp.
   b. National Gypsum Company.
   c. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.

3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 3 requirements.

4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.

5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.

6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements in accordance with test in Annex A1.

7. Long Edges: Tapered.

8. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Plastic, PVC.
2. Shapes:

   a. Cornerbead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   f. Expansion (control) joint.
   g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 Fiberglass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or 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 compound.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 4 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:

1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

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 thick.

D. Sound-Attenuation Blankets: ASTM C665, 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.

E. Acoustical Sealant: As specified in Section 07 92 00 "Joint Sealants."

F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C 840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. 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.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 2: Joint treatment for areas indicated to receive no further finish, including unfinished service areas, mechanical and electrical rooms, janitors closets.
2. Level 3: Joint treatment for areas indicated to receive textured and tile wall panel finishes.
3. Level 5: At panel surfaces that will be exposed to view unless otherwise indicated.

H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

I. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.2 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 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - General

1.1 SUMMARY

A. Section Includes:
1. Porcelain tile.
2. Glazed wall tile.
3. Tile backing panels.
4. Waterproof membrane for thinset applications.
5. Crack isolation membrane.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide samples of each color blend.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and Stone thresholds.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

B. Installer Qualifications:

1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
3. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

A. Manufacturers and Product: See Interior Design and Architect Drawings.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. See Section 09 30 50 Tile Accessories for material.

2.5 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.2-mm) nominal thickness.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Schluter Systems L.P.

2.6 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02. Provide materials composed as follow. With physical properties equaling or exceeding those required for thin-set mortars based on testing of thick-bed specimens according to ANSI A108.1A.

1. Prepackaged dry-mortar mix.
2. Reinforcing Wire Fabric: Galvanized, welded wire fabric 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bonsal American, an Oldcastle company.
    b. C-Cure.
    c. Custom Building Products.
    d. LATICRETE SUPERCAP, LLC.
    e. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.

3. For wall applications, provide nonsagging mortar.

2.7 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bonsal American, an Oldcastle company.
    b. Bostik, Inc.
    c. C-Cure.
    d. Custom Building Products.
    e. Jamo Inc.
    f. LATICRETE SUPERCAP, LLC.
    g. MAPEI Corporation.

2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bonsal American, an Oldcastle company.
b. Bostik, Inc.
c. C-Cure.
d. Custom Building Products.
e. Jamo Inc.
f. LATICRETE SUPERCAP, LLC.
g. MAPEI Corporation.

C. Grout for Pre-grouted Tile Sheets: Same product used in factory to pre-grout tile sheets.

2.8 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. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Schluter Systems L.P. – Basis of Design See Section 09 30 50 Tile Accessories

C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bonsal American, an Oldcastle company.
b. Custom Building Products.
c. Jamo Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, 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 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

   a. Tile floors in wet areas.
   b. Tile floors consisting of tiles 8 by 8 inches or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch.
2. Quarry Tile: 1/4 inch.
3. Pressed Floor Tile: 1/4 inch.
4. Glazed Wall Tile: 1/16 inch.
5. Porcelain Tile: 1/4 inch.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in improved modified dry-set mortar (thinset).
2. Do not extend waterproofing or crack isolation membrane under thresholds set in improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.

J. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

K. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

L. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:
   1. **Ceramic Tile Floor Installation:** Typical tile floor installation unless indicated otherwise with thin bed designation.
      a. Tile Type: See Drawings.
      b. Installation Method: **TCA F113-05** (Latex-Portland cement mortar bond coat over concrete).
      c. Requirements:
         1) Slab to be well cured, dimensionally stable, and free to cracks, waxy or oily films, and curing compounds. Refer to Division 3 Section “Cast-in-Place” Concrete.
         2) Bond coat: 3/32-inch minimum.
         3) Provide waterproofing and crack-isolation membrane under entire tile, to bridge cracks and waterproof in wet areas.
         4) Provide stainless steel square grate at drains in toilet rooms.

      d. Setting Bed and Grout: ANSI A118.1 or ANSI A118.4 for mortar and ANSI A118.6 or A118.7 for grout with the following mortar and grout:
         1) Latex-portland cement mortar.
         2) Unsanded Polymer-Modified tile grout.

   2. **Ceramic Tile Installation:** TCNA F131; water-cleanable, tile-setting epoxy; epoxy grout.
      a. Ceramic Tile Type: . See Drawings.
      b. Grout: Water-cleanable epoxy grout.

B. Interior Wall Installations, Masonry or Concrete:

   1. **Ceramic Tile Installation**: TCNA W202; thinset mortar.
      a. Ceramic Tile Type: See Drawings.
      b. Thinset Mortar: Improved modified dry-set mortar.
      c. Grout: Water-cleanable epoxy grout.

   2. **Stone Installation**: TCNA W211 Stone, ANSI A108.1C; thinset mortar.
      a. Exterior Stone Cladding Type: See Drawings.
      b. Thinset Mortar: Improved modified dry-set mortar.
      c. Grout: Unsanded Polymer-Modified tile grout. Match color to exterior mortar.

C. Interior Wall Installations, Wood or Metal Studs or Furring:

   1. **Ceramic Tile Wall Installation:** Typical wall installation unless indicated otherwise and comply with the following:
      a. Tile Type: See Drawings.
      b. Installation Method: **TCA W244-05** (thin-set mortar bonded to Cementitious backer units on metal studs).
      c. Requirements:
         1) Set tile in latex-portland cement mortar.
         2) Stud spacing maximum 16-inches on center.
         3) Minimum recommended stud depth 3-5/8-inch.
         4) Metal studs, 20 gauge (0.039-inch) or heavier.

5) Provide waterproofing membrane at shower application in conjunction with TCA B415-05.
6) 2-inch wide glass fiber mesh tape at Cementitious back board.

d. Setting Bed and Grout: ANSI A108.5 with the following mortar and grout:
1) Latex-portland cement mortar.
2) Unsanded polymer modified tile grout.

PART 4 - INSTALLER'S WARRANTY

4.1 FLOORING INSTALLER'S WARRANTY

A. WHEREAS _____of_____, herein called the "Flooring Installer," has performed flooring and associated work ("work") on the following project:

1. Owner:_____.
2. Address:_____.
3. Building Name/Type:_____.
4. Address:_____.
5. Area of Work:_____.
6. Acceptance Date:_____.
7. Warranty Period:_____.
8. Expiration Date:_____.

B. AND WHEREAS Flooring Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against faulty or defective materials and workmanship for designated Warranty Period.

C. NOW THEREFORE Flooring Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to b made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a acceptable condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. act of God;
   b. Failure of flooring system substrate, (not installed by flowing contractor, including cracking, settlement, deterioration, and decomposition;
   c. Activity on flowing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of the foregoing causes, Warranty shall be null and void until such damage has been repaired by Flooring Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Flooring Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Flooring Installer, including cutting, patching, and maintenance in connection with attachment of other work, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Flooring Installer to perform said alterations, Warranty shall not become null and void unless Flooring Installer, before starting said work, shall have notified Owner in writing,

showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.

5. Owner shall promptly notify Flooring Installer of observed, known, or suspected defects, or deterioration and shall afford reasonable opportunity for Flooring Installer to inspect work and to examine evidence of such defects, or deterioration.
6. This Warranty is recognized to be the only warranty of Flooring Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of flooring failure. Specifically, this Warranty shall not operate to relieve Flooring Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

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

1. Authorized Signature:_____
2. Name:_____
3. Title_____

END OF SECTION 09 30 13

SECTION 09 30 50 – TILE ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Finishing and edge-protection profiles for walls and countertops.

B. Movement joint and cove-shaped profiles.

C. Uncoupling membrane.

D. Waterproofing Membrane.

E. Floor drain, with integrated bonding flange.

F. Shower waterproofing: prefabricated substrates, waterproofing membrane, floor drain with integrated bonding flange, and sealant.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 90 00 - Joint Protection.

D. Section 09 29 00 - Gypsum Board.

E. Section 09 30 00 - Tiling.

F. Section 22 30 00 - Plumbing Equipment.

1.3 REFERENCES

A. CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

B. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

C. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

D. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

B. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

D. Preinstallation Conference: Conduct conference at the Project site.

1. Convene one week prior to commencing work of this section.
2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
3. Meeting agenda includes but is not limited to:

a. Surface preparation.
b. Tile and installation material compatibility.
c. Edge protection, transition and pre-fabricated movement joint profiles.
d. Waterproofing techniques.
e. Crack isolation techniques.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. ASD. Tel: (800) 472-4588. Fax (800) 477-9783. E-mail:specassist@schluter.com. Web:www.schluter.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS AND COUNTERTOPS

A. Schluter-QUADEC

1. Description: profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
2. Corners:

    a. Provide with matching inside corners.
    b. Provide with matching outside corners.
    c. Provide with internal connectors.

3. Material and Finish:

    a. E - Stainless Steel Type 304 = V2A.

        1) Height as required to coordinate with tile selection and setting system selected.

2.3 FINISHING AND EDGE-PROTECTION PROFILES FOR STAIR NOSINGS

A. A. Schluter®-TREP-E

1. 1. Description: roll-formed stainless steel (type 304 = V2A) profile with ribbed, 1-3/16" (30 mm) wide exposed surface with rounded leading edge, and integrated trapezoid-perforated anchoring leg.

2. End Caps:

    a. Provide matching end caps

3. Material and Finish:

    a. E - Stainless Steel Type 304 = V2A

4. Height: Height as required

2.4 MOVEMENT JOINTS AND COVE-SHAPED PROFILES

A. Schluter-DILEX-HKU

1. Description: roll-formed stainless steel cove-shaped profile with 3/8 inch (10 mm) radius that forms the visible surface and an internal integrated trapezoid-perforated anchoring leg .
2. Corners:

    a. Provide with matching inside corners.
    b. Provide with matching outside corners.
    c. Provide with matching end caps.
    d. Provide with matching connectors.

2.5 UNCOUPLING MEMBRANE

A. Schluter-DITRA

1. Description: 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane with a grid structure of 1/2 inch by 1/2 inch (12 mm by 12 mm) square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to its underside. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation and is listed by cUPC to meet or exceed the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10 and is listed by cUPC, and is evaluated by ICC-ES (see Report No. ESR-2467).

2. Waterproofing seaming membrane:

a. Provide KERDI BAND Seams and Corners material 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.

2.6 WATERPROOFING MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. C-Cure; Pro-Red Waterproofing Membrane 963.

b. Custom Building Products; Redgard Waterproofing and Crack Prevention Membrane.

c. Jamo, Inc.; Waterproofing Membrane.

2.7 FLOOR DRAIN WITH INTEGRATED BONDING FLANGE

A. Schluter-KERDI-DRAIN ADAPTER, Stainless Steel:

1. Description:

a. Floor drain adaptor kit consisting of stainless steel adaptor ring with over-molded santoprene gasket, 9.843 inch (250 mm) diameter sloped integrated bonding flange, and grate assembly. Grate assembly includes stainless steel grate, height adjustment collar, and lateral adjustment ring with trapezoid perforations.

b. Drain detail as referenced in method B422 and B422C of the Tile Council of North America Handbook for Ceramic Tile Installation.

2. Drain Housing Material:

a. Stainless Steel.

3. Grate Material and Finish:

a. E - Stainless Steel Type 304 = V2A.

4. Nominal Grate Size:

a. 6 inch (150 mm) by 6 inch (150 mm) square.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09 30 50

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Acoustical ceiling tile.

1.03 SUBMITTALS

A. Product Data: For products indicated.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Ceiling Panels: Set of 12-inch- square Samples of each type, color, pattern, and texture.
2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

C. Maintenance Data: For ceiling panels and grid.

1.04 QUALITY ASSURANCE

A. Source Limitations:

1. Ceiling Panels: Obtain 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 panel ceilings that comply with the following requirements:

1. Surface-Burning Characteristics: Provide acoustical panels with the following surface- burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

a. Smoke-Developed Index: 450 or less.

C. Preinstallation Conference: Conduct conference at Project site.

1.05 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 in any way.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.07 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-suppression system, and partition assemblies.

1.08 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include: sagging and warping, and rusting of the suspension system and components.

B. Warranty Periods:

1. Acoustical Panels: Ten (10) years from the Date of Substantial Completion.
2. Grid: Ten (10) years from the Date of Substantial Completion.
3. Acoustical panels and grid system provided by the same manufacturer shall be warranted for fifteen (15) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Standard for Acoustical Ceiling Units: ASTM E 1264 classifications as designated by reference to types, patterns, acoustical ratings, and light reflectance's, unless otherwise indicated.

1. Colors and Patterns: Provide products to match appearance characteristics indicated under each product type.

B. Acoustic Ceiling Panels

1. Basis of Design Products and Manufacturer:

   a. Type A1 – Armstrong 1728 Fine Fissured, 24 X 24 X 7/8”, Square Edge Lay In, White, Prelude XL 15/16” Exposed Tee in White.
   b. Type A2 – Armstrong 1754 Fine Fissured High NRC, 24 X 24 X 7/8”, Square Edge Lay In, White, Prelude XL 15/16” Exposed Tee in White.

2. Subject to compliance with requirements, other acceptable Manufacturers offering product which may be incorporated into the work are but not limited to the following:

   a. CertainTeed Corporation.
   b. Chicago Metallic Corporation.
   c. United States Gypsum Company.

2.02 CEILING SUSPENSION SYSTEMS

A. Basis of Design: Armstrong World Industries.
   1. Subject to compliance with requirements, other acceptable Manufacturers offering product which may be incorporated into the work are but not limited to the following:
      a. Chicago Metallic Corporation.
      b. Donn “DX” by USG Interiors Inc.

B. Suspension systems shall meet or exceed the requirements of ASTM C 635 for dimensional tolerances, coatings and finishes, and load carrying capabilities. Individual component deflection shall not exceed 1/360 of the span.

C. Finishes and Colors: Provide hot-dipped galvanized finish (G-30 minimum) on all ceiling suspension components. Exposed surfaces of suspension system components shall receive white baked-on enamel paint.

D. Acoustical Lay-In System: Grid with 15/16" and 9/16” face, locations as indicated.

E. Color: White unless noted otherwise on the drawings.

F. Wall channel: Hemmed edge type.

G. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

H. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

   1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

   2. 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- diameter wire.

2.03 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel

edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

2.04 ACOUSTICAL SEALANT

A. Refer to section 07 92 00 “Joint Sealants.”

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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.

3.03 INSTALLATION, GENERAL

A. General: Install acoustical panel ceilings to comply with ASTM C 636 per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required

to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will

   not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not attach hangers to steel roof deck. Attach hangers to structural members.
6. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

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 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.
2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 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. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

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SECTION 09 51 26.1 - WOOD GRILLE CEILING PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

a) Section Includes:

1. WoodWorks Grille-Forté Veneered Wood Ceiling Panels with Centered Notched and Flat Backers
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

b) Related Sections:

1. Section 09 53 00 - Acoustical Ceiling Suspension Assembly
2. Section 09 20 00 - Plaster and Gypsum Board
3. Section 09 22 16 - Non-Structural Metal Framing
4. Divisions 23 (15) - HVAC
5. Division 26 (16) Sections - Electrical Work

c) Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, submit proposed product substitutions no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect’s review and acceptance. Approved products will be set forth by the Addenda. If a substitution is included in a Bid and is not approved by an Addendum, the specified products shall be provided as in place of the substitute without additional compensation.
2. Submittals, which do not provide adequate data for the product evaluation, will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

a) American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, and Cold Rolled Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
8. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
9. ASTM E 1264 Classification for Acoustical Ceiling Products.
10. Hardwood Plywood & Veneer Association (HPVA)
11. International Building Code
12. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality
13. NFPA 70 National Electrical Code
14. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
15. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
16. International Code Council-Evaluation Services Report - Seismic Engineer Report
    A. ESR 1308 - Armstrong T-Bar or Dimensional Suspension
17. California Air Resources Board (CARB) compliant
18. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.4 SUBMITTALS

a) **Shop Drawings:** Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.

b) **Installation Instructions:** Submit manufacturer's installation instructions as referenced in Part three, Installation.

c) **Product Data:** Submit manufacturer's technical data for each type of ceiling unit and suspension system required.

d) **Samples:** 4-1/4"x 7"x 3/4 – Real Wood Veneer on fire rated particle board– Semi-gloss tinted topcoat – Clear Finish

e) **Certifications:** Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

f) **Non-Conformance:** All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

1.5 QUALITY ASSURANCE

a) Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.

b) Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E-84 and complying with ASTM E 1264 for Class A products.
2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

c) Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

d) Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

a) Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

b) Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

c) Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.7 PROJECT CONDITIONS

a) Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

b) The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.

c) As interior finish products, the veneered panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.8 WARRANTY

a) Veneered Wood Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

    1. Veneered Wood Panels: Defects in materials or factory workmanship.
    2. Grid System: Rusting and manufacturing defects.

b) Warranty Period:

    1. Veneered Wood panels: One (1) year from date of installation.
    2. Grid: Ten years from date of installation.

c) The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

a) Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

    1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
    2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

a) Basis of Design: WoodWorks Grille - Forte' Veneered Ceilings Panels:

1. Armstrong World Industries, Inc.

b) Suspension Systems:

1. Armstrong World Industries, Inc.

2.2.0 WOOD CEILING UNITS

a) Ceiling Panels Type E-1:

1. Surface Texture: Smooth
2. Composition: Real wood veneer on fire rated particle board
3. Finish(s): Real Wood Veneer
   - SEE DRAWINGS FOR SPECIES.
   - Plain Panel Width: 12-inch

   Panel Length Size(s): With 1" reveal panel to panel @ length

   - 48-inch (Nominal): 47-inch (Actual)
   - 72-inch (Nominal): 71-inch (Actual)
   - 96-inch (Nominal): 95-inch (Actual)

   <u>Slat Width 3/4-inch:</u>

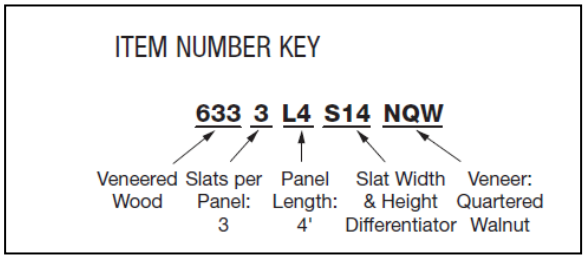
   Height – Number of Slats (Spacing) [item#]

   1) 3-1/2" – 5 Slats (1-5/8") [6335L_S16---]
4. Acoustical Performance Infill Options:
   1) Calla Square Layin panel - Item 2820BK – NRC 0.85, CAC 35.
5. Flame Spread:

   Class A: ASTM E84 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less.

   CAN/ULC S102 surface burning characteristics. Flame Spread Rating 25 or less. Smoke Developed Classification 50 or less.
6. Acceptable Product: WoodWorks Grille Forté Veneered Panels –items 6333L_ S14-S17, 6334L_S14-S14, 6335L _S14_S17, 6336L_S14-S16 as manufactured by Armstrong World Industries.

Please use ordering format found on our data page:



b) Accessories:

1. Backer Clip - item 5687
2. Flat Backer Kit - item7920GBL
3. Heavy Duty Wall Anchor – item 7100

2.2.1 SUSPENSION SYSTEMS

c) Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

1. Structural Classification: ASTM C635 (Heavy Duty).
2. Color: Tech Black.
3. Acceptable Product: Prelude XL 15/16" Exposed Tee Main beam item 7301BL, Prelude XL Exposed Tee item XL7341BL, Prelude XL Exposed Tee 2’ item XL7328BL as manufactured by Armstrong World Industries, Inc.

d) Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

e) Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12 gauge.

f) Accessories/Edge Moldings and Perimeter Trim:

a. 7/8” Angle Wall Molding - item7800BL
b. 4” Veneered Trim with 4 Clips – item 6481F07W1H4---(Finish Suffix)
c. Replacement Trim Clip – item 5925
d. Adjustable Trim Clip – item 7239
e. WoodWorks Edgebanding – item 6408---(Finish Suffix)

PART 3 - EXECUTION

3.1 EXAMINATION

a) Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

b) Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

a) Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

b) WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

3.3 INSTALLATION

a) Interior WoodWorks products, the veneered wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

b) Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer’s WoodWorks Grille Forté Veneered Installation Instructions.

3.4 ADJUSTING AND CLEANING

a) Replace damaged and broken panels.

b) Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer’s instructions for cleaning and touch up of minor finish damage.

END OF SECTION 09 51 26.1

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SECTION 09 51 26.2 WOOD LINEAR CEILING PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

a) Section Includes:

1. WoodWorks Linear Veneered OPEN.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

b) Related Sections:

1. Section 09 53 00 - Acoustical Ceiling Suspension Assembly
2. Section 09 20 00 - Plaster and Gypsum Board
3. Section 09 22 16 - Non-Structural Metal Framing
4. Divisions 23 (15) - HVAC
5. Division 26 (16) Sections - Electrical Work

c) Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, submit proposed product substitutions no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect’s review and acceptance. Approved products will be set forth by the Addenda. If a substitution is included in a Bid and is not approved by an Addendum, the specified products shall be provided as in place of the substitute without additional compensation.
2. Submittals, which do not provide adequate data for the product evaluation, will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); panel design, size, composition, color, and finish; suspension system component profiles and sizes; compliance with the referenced standards.

1.3 REFERENCES

a) American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, and Cold Rolled Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
8. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
9. ASTM E 1264 Classification for Acoustical Ceiling Products.
10. Hardwood Plywood & Veneer Association (HPVA)
11. International Building Code
12. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality
13. NFPA 70 National Electrical Code
14. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
15. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
16. International Code Council-Evaluation Services Report - Seismic Engineer Report
    A. ESR 1308 - Armstrong T-Bar or Dimensional Suspension
17. California Air Resources Board (CARB) compliant
18. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.4 SUBMITTALS

a) **Shop Drawings:** Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.

b) **Installation Instructions:** Submit manufacturer's installation instructions as referenced in Part three, Installation.

c) **Product Data:** Submit manufacturer's technical data for each type of ceiling unit and suspension system required.

d) **Samples:** Real Wood Veneer on fire rated particle board – Semi-gloss tinted topcoat – Clear Finish

e) **Certifications:** Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

f) **Non-Conformance:** All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

1.5 QUALITY ASSURANCE

a) Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.

b) Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.

   1. Surface Burning Characteristics: As follows, tested per ASTM E-84 and complying with ASTM E 1264 for Class A products.
   2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

c) Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

d) Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.6 DELIVERY, STORAGE, AND HANDLING

a) Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

b) Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

c) Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.7 PROJECT CONDITIONS

a) Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

b) The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.

c) As interior finish products, the veneered panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.8 WARRANTY

a) Veneered Wood Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

    1. Veneered Wood Panels: Defects in materials or factory workmanship.
    2. Grid System: Rusting and manufacturing defects.

b) Warranty Period:

    1. Veneered Wood panels: One (1) year from date of installation.
    2. Grid: Ten years from date of installation.

c) The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

a) Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

    1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
    2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

a) Basis of Design: WoodWorks Linear Veneered OPEN:

1. Armstrong World Industries, Inc.

b) Suspension Systems:

1. Armstrong World Industries, Inc.

2.2.0 WOOD CEILING UNITS

a) Ceiling Panels **Type E-2:**

- Surface Texture: Smooth
- Composition: Real wood veneer on fire rated particle board
- Finish(s): Real Wood Veneer
  - SEE DRAWINGS FOR SPECIES.

  Panel Width Size(s): With 3/4" reveal Plank to Plank @ Width
  - 4-inch (O.C.): 3-3/4-inch Plank Width (Actual)

  Panel Length Size(s): With no reveal @ Length
  - 96-inch (Actual)

  <u>WoodWorks Linear Veneered Open Options:</u>

  Height – (Plank Width) – Reveal Width [item#]
- 8' x 3.62" x .719" 6384F01E2W1___ (WW Linear Veneered Closed 4" Wide- Beveled Edge)
- Acoustical Performance Infill Options:
  - Calla Square Lay-in panel - Item 2820BK
- Flame Spread:

  Class A: ASTM E84 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less.

  CAN/ULC S102 surface burning characteristics. Flame Spread Rating 25 or less. Smoke Developed Classification 50 or less.
- Acceptable Product: WoodWorks Linear Veneered Open – items [6440F01W1 _ _ _] and [66460F01W1 _ _ _] as manufactured by Armstrong World Industries.

b) Accessories:

a. Mounting Clip – Item 5389
b. Spring Border Clips- Item 7870
c. Adjustable Trim Clip - Item 7239
d. Replacement Trim Clip – Item 5925
e. Heavy-duty Wall Anchor (seismic) – Item 7100

2.2.1 SUSPENSION SYSTEMS

c) Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

1. Structural Classification: ASTM C635 (Heavy Duty)
2. Color: Tech Black.
3. Acceptable Product: 12’ HD Linear Carriers Prelude XL 7301 , Prelude XL 2’ Cross Tee XL8320 BL as manufactured by Armstrong World Industries, Inc.
4. 12-Gauge Hanger Wire – Item 7891

d) Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

e) Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12 gauge.

f) Accessories/Edge Moldings and Perimeter Trim:

a. Shadow Molding (seismic) - Item7823
b. Angle Molding – Item 7805
c. WoodWorks Linear Veneered Open Grid Tee Snap-In Clip – Item 5373
d. 4” Veneered Trim with 4 Clips – item 6481F07W1H4_ _ _ (Finish Suffix available: NWM, NWA, NOK, NPC, NWN, NVF, NRO, NQW, NQS, NWM) - W/Real Wood Edge banding
e. WoodWorks Edge banding (Coordinating Faux Wood) – Item 6408_ _ _ (Finish Suffix available: All)

PART 3 - EXECUTION

3.1 EXAMINATION

a) Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

b) Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

a) Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

b) WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

3.3 INSTALLATION

a) Interior WoodWorks products, the veneered wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

b) Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer's WoodWorks Linear Veneered Panels Installation Instructions.

3.4 ADJUSTING AND CLEANING

a) Replace damaged and broken panels.

b) Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION 09 51 26.2

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SECTION 09 60 13 - ACOUSTIC UNDERLAYMENT

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this section includes:
1. Types of re-bonded recycled rubber sound control underlayment to be placed under flooring in living units
2. Adhesive

B. Related Sections: Section related to this article include:
1. Concrete Substrate
2. Floor finishes.

1.2 References

A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. The standards listed are identified by an issuing authority, authority abbreviation, designation number, title, or other designation established by the issuing authority. The standards subsequently referenced herein are referred to by an issuing authority and standard designation.

B. ASTM International (ASTM):
1. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
2. ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
3. ASTM E989 - Standard Classification for Determination of Impact Insulation Class (IIC)
4. ASTM E1007 - Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
5. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
6. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
7. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
8. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in-situ Probes
9. ASTM D5116 CHPS/CA 01350 – Collaborative of High Performance Schools, LowEmitting Materials Criteria
10. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
11. ASTM F924 Standard Test Method for Resistance to Puncture of Cushioned Resilient Floor Coverings
12. ASTM F1265 - Standard Test Method for Resistance to Impact for Resilient Floor Tiles

13. ASTM F2753 - Standard Practice to Evaluate the Effects of Dynamic Rolling Load over Resilient Floor Covering System
14. ASTM D5215 - Standard Test Method for Instrumental Evaluation of Staining of Vinyl Flooring by Adhesives
15. ASTM D297 - Standard Test Method for Rubber Products - Chemical Analysis
16. ASTM C627 - Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson Wheel-Type Floor Tester
17. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes

B. South Coast Air Quality Management District (SCAQMD) Rule # 1168
   1. VOC standards for adhesive and sealant applications

C. International Organization for Standardization® document, ISO 14021 – Provides guidance on the terminology, symbols, testing, and verification methodologies that an organization should use for self-declaration of the environmental aspects of its products and services.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide recycled rubber resilient flooring, which has been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

1.4 SUBMITTALS

A. Product Data: Submit product data, including manufacturer’s guide specifications product sheet, for specified products.

B. Shop Drawings: Manufacturer’s specifications, catalog cuts, and other items needed to demonstrate compliance with the specified requirements. Also the manufacturer’s recommended installation procedures, which, when approved by the architect, will become the basis for accepting or rejecting actual installation procedures used on work.

C. Samples: Submit selection and verification samples for finishes, colors, and textures.

D. Quality Assurance Submittals: Submit the following:
   1. Certificates: If required, certification of performance characteristics specified in this document shall be provided by the manufacturer.
   2. Manufacturer’s Instructions: Manufacturer’s installation instructions.
   3. Sound Control Underlayment material manufacturer shall provide a Certificate of Compliance certifying that the material is compliant with all of the material specifications as outlined in Section 2, and the Certificate of Compliance shall be stamped by a Professional Engineer.

E. Closeout Submittals: Submit warranty documents specified herein.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
   1. Certificate: When requested, submit certificate indicating qualification.
   2. Manufacturers' Qualifications: Manufacturer capable of approving application method.

B. Regulatory Requirements: [specify applicable requirements of regulatory agencies].

C. Mock-Ups: Install at project site a job mock-up using acceptable products and manufacturer-approved installation methods. Comply with workmanship standard.
   1. Mock-Up Size: As determined by acoustical consultant.
   2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
   3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

D. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's instructions, and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Delivery: Deliver materials in manufacturer's original, unopened, and undamaged containers with identification labels intact.

C. Storage and Protection: Store materials at temperature and humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.

1.7 PROJECT CONDITIONS

A. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.8 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
   1. Provide manufacturer's limited lifetime warranty on the Sound Control Underlayment products against defects in material and workmanship and that the products shall meet all published specifications and shall perform effectively. Manufacturer warranties that during the warranty period the products shall not harden, become brittle, chip, crack, tear, or exhibit any signs of excessive deterioration except for normal wear and tear. The sole remedy against the seller will be the replacement or repair of the defective goods, or at seller's option, credit may be issued not exceeding the selling price of the defective goods.

1.9 MAINTENANCE

A. Extra Materials: Deliver to Owner extra materials from the same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals (Maintenance Materials) Section.
   1. Quantity: Furnish quantity of re-bonded recycled rubber Sound Control Underlayment units as requested on purchase order.
   2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage, and protection of extra materials.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

A. Acceptable manufacturers:
   1. Basis of design: Pliteq Inc., Pliteq GenieMat RST05**,** Re-Bonded Recycled Rubber Sound Control Underlayment.
      a. Address: 131 Royal Group Crescent, Vaughan, ON L4H 1X9; Telephone: (416) 449-0049; Fax: (416) 849-0415; Email: info@pliteq.com

2.2 MATERIAL.

A. Type: Non-laminated, single-ply re-bonded rubber underlayment shall be recycled rubber sound control underlayment.

B. Material: Made from 94% recycled rubber content. Underlayment shall be flat, resilient underlayment that is used directly under a variety of floor finishes in wood, steel, and concrete construction, yielding exceptional results for impact sound insulation and protecting ceramic, porcelain, and stone from substrate cracks.

C. Sheet Dimension: Rolled rubber underlayment shall have an overall nominal thickness of 1/4" standard in 4' by 30' roll size.

D. Sheet Weight: Rolled rubber underlayment will have an overall weight of 1.0 lb/ft^2 standard.

E. Sheet Standard Tolerances: Roll width: ± 3/4", Roll length: ± 1%, Thickness: ± 10%.

F. Reduction of Impact Sound Pressure Level (Lw) (BN ES ISO 14088): 19 dB.

G. Impact Insulation Class Laboratory (ASTM E492): Specified floor-ceiling assembly must be tested in a NVLAP certified laboratory and comply with ASTM standards with the following floor-ceiling configurations:
1. Underlayment thickness shall be tested over 8" concrete slab with tile, resilient clip supported ceiling to an IIC rating of 55 or greater.

H. Sound Control Underlayment material shall have an Impact Insulation Class (IIC) Laboratory result as tested per ASTM E492 with the following floor-ceiling configurations:
1. Underlayment shall be tested over 8" concrete slab with ceramic or stone tile, resilient clip supported ceiling to an IIC rating of 55 or greater.
2. The floor-ceiling assembly must be tested in a certified laboratory and comply with ASTM or ISO standards.

I. Sound Control Underlayment material shall have a measured density per ASTM D1622 of a minimum of 60.9 lb/ ft^3.

J. Sound Control Underlayment material shall have a structural performance rating when used to support ceramic or stone tile on a 2" concrete base per ASTM C627 of Moderate Commercial Rating.

K. Sound Control Underlayment shall have an approved system with maximum MVER per ASTM F2170 of 90%.

L. Sound Control Underlayment material shall have a measured acceleration responding to standardized ASTM E989 impact source of:
<0.0009G @ 63 Hz
< 0.0016G@ 80 Hz
< 0.0015G@ 100 Hz
(when measured for 15mm thickness)

M. Sound Control Underlayment material shall have an Impact Insulation Class (IIC) Laboratory result as tested per ASTM E492 and/or ASTM E2179 with the following floor ceiling configurations:
1. Underlayment shall be tested over 6" concrete slab with vinyl plank floor covering, no ceiling, IIC 50, IIC21
2. Underlayment shall be tested over 6" concrete slab with 3/8" laminate wood floor covering, no ceiling, IIC 51 and IIC 21
3. Underlayment shall be tested over 6" concrete slab with 12"x12" ceramic tile, no ceiling IIC50 and IIC21
4. The floor-ceiling assembly shall be tested in a certified laboratory and comply with ASTM or ISO standards.

N. Impact Insulation Class Field (ASTM E1007): Floor-ceiling assembly must meet requirement as stated by building code and/or acoustical consultant.

O. Reduced Impact Sound Transmission (ASTM E2179): Specified floor-ceiling assembly must be tested in an accredited laboratory and comply with ASTM standards.

P. Sound control underlayment shall meet the requirements for the Standard Method for the Testing and Evaluation of VOC Emissions from Indoor Sources using Environmental Chambers, version 1.1 of February 2010 set out by the California Department of Public Health when tested using the ASTM D5116 test methodology.

Q. When Sound Control Underlayment is specified under vinyl tile flooring, the average puncture failure height of the assembly of the vinyl tile and the underlayment shall be no less than when the vinyl is tested on its own using ASTM F924 test methodology.

R. When Sound Control Underlayment is specified under vinyl tile flooring, the assembly of the vinyl tile and underlayment shall show no breaking or cracking when tested to ASTM F1265.

S. When Sound Control Underlayment is specified under vinyl tile flooring, the assembly shall no signs of indentation or plank/tile separation up to 12,500 cycles using ASTM F2753 test methodology.

T. Sound Control Underlayment shall meet requirements for point load crack isolation when tested in accordance with ANSI 118.12 and achieve a minimum load of 1319 lb before tile fracture.

U. Sound control underlayment shall be FloorScore® certified.

2.3 RE-BONDED RECYCLED RUBBER PERIMETER ISOLATION STRIP:

A. Basis of design: Pliteq GenieMat PMI05R.

B. Type: The non-laminated, single-ply re-bonded rubber perimeter isolation strip shall be Re-bonded Recycled Rubber Perimeter Isolation Strip.

C. Material: Made from 94% recycled rubber content, Perimeter Isolation Strip shall be a flat, resilient strip that is used to build a tub around the floor so that no hard surface (floor covering) touches any hard vertical surface protrusion or wall.

D. Sheet Dimension: Rrolled perimeter isolation strip shall have an overall nominal thickness of 1/4” in 3” by 30’ roll size.

2.4 Sheet Weight: Rrolled perimeter isolation strip shall have an overall weight of 1.0 lb/ft^2.

2.5 POLYETHYLENE FOAM PERIMETER ISOLATIONSTRIP:

A. Basis of design: Pliteq GenieMat, PMI06PF.

B. The single-ply white polyethylene foam perimeter isolation strip shall be Polyethylene Foam Perimeter Isolation Strip.

C. Material: Made from white polyethylene foam, Polyethylene Foam Perimeter Isolation Strip shall be a flat, resilient strip that is used to build a tub around the floor so that no hard surface (floor covering) touches any hard vertical surface (protrusion or wall).

D. Sheet Dimension: Rrolled polyethylene foam perimeter isolation strip will have an overall nominal thickness of 1/4” in 3” by 15’ roll size.

E. Sheet Weight: Rrolled polyethylene foam perimeter isolation strip shall have an overall weight of 0.035 lb/ft^2.

2.5 SOURCE QUALITY

A. Source Quality: Obtain re-bonded recycled rubber impact sound insulation materials from a single manufacturer.

PART 3 – EXECUTION

3.1 MANUFACTURERS' INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 PREPARATION

A. Surface Preparation: Surfaces shall be prepared in accordance with ANSI standards.

3.4 ERECTION/INSTALLATION/APPLICATION/CONSTRUCTION

A. Re-bonded Recycled Rubber Sound Control Underlayment: Comply with the manufacturer's Technical Installation Manual for procedures and techniques for re-bonded recycled rubber Sound Control Underlayment installation.

B. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

C. Installation shall not begin until all other trades are finished in the area.

D. Areas to receive the re-bonded recycled rubber Sound Control Underlayment shall be weather tight and maintained at a minimum uniform temperature of 65^{o}F for 48 hours before, during, and after the installation.

3.5 FIELD QUALITY REQUIREMENTS:

A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations in accordance with manufacturer's instructions.

B. Field Tests should be performed by an independent acoustical laboratory accredited by the U.S. Department of Commerce, National Institute of Standards and Technology under the National Voluntary Laboratory Accreditation Program for the specified test procedure.

C. The cost for all field acoustical testing, corrective work associated with the installation of the re-bonded recycled rubber Sound Control Underlayment and flooring to meet the minimum requirements, shall be borne by the flooring contractor(s).

3.6: CLEANING

A. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.7 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 09 60 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Chair Rail.

1.2 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
   1. Level Surfaces: Minimum 0.6.
   2. Step Treads: Minimum 0.6.

1.3 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.

1.4 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.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 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 and Products: See Interior Design Drawings.

B. Chair Rail:
   1. Manufacturers and Products: See Interior Design Drawings.

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. Use preformed Corners

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
    1. Remove adhesive and other blemishes from exposed surfaces.
    2. Sweep and vacuum surface thoroughly.
    3. Damp-mop surfaces to remove marks and soil.
        a. Do not wash surfaces until after time period recommended by manufacturer.
        b. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
C. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.
B. Related Documents
   1. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.
C. Related Sections:
   1. Other Division 9 sections for floor finishes related to this section but not the work of this section
   2. Division 3 Concrete; not the work of this section
   3. Division 6 Wood and Plastics; not the work of this section
   4. Division 7 Thermal and Moisture Protection; not the work of this section

1.02 REFERENCES

A. Armstrong Flooring Technical Manuals
   1. Armstrong Flooring Guaranteed Installation Systems manual, F-5061
B. ASTM International:
   1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
   2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
   3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
   4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
   5. ASTM F 1700 Standard Specification for Solid Vinyl Tile
   6. ASTM F 1861 Standard Specification for Resilient Wall Base
   7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
   8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C. National Fire Protection Association (NFPA):
   1. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
   2. NFPA 258 Standard Test Method for Measuring the Smoke Generated by Solid Materials

1.03 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer without defects, damage, or failure.
B. Administrative Requirements
   1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to

verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

2. Pre-installation Testing: Conduct pre-installation testing as follows: [Specify testing (i.e. moisture tests, bond test, pH test, etc).]

C. Sequencing and Scheduling
   1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
   2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.04 SUBMITTALS

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of Armstrong Flooring Guaranteed Installation Systems manual, F-5061. for flooring and accessories.

B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.

C. Submit Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers, patching/leveling compounds, floor finishes (polishes) and cleaning agents and Material Information Sheets for flooring products.

D. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

E. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.

B. Select an installer who is experienced and competent in the installation of Armstrong resilient solid vinyl tile flooring and the use of Armstrong Flooring subfloor preparation products.
   1. Engage installers certified as Armstrong Commercial Flooring Certified Installers
   2. Confirm installer's certification by requesting their credentials

C. Fire Performance Characteristics: Provide resilient tile flooring with the follow

ing fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 (NFPA 253) Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I
2. ASTM E 662 (NFPA 258) (Smoke Generation) Maximum Specific Optical Density of 450 or less

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with Division 1 Product Requirements Sections

B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

D. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.07 PROJECT CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of [100ºF (38ºC)] [85ºF (29ºC)] for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to the Armstrong Flooring Guaranteed Installations Systems manual, F- 5061 for a complete guide on project conditions.

1.08 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Limited Warranty Period: 20 years for Natural Creations with Diamond 10 Technology.

C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Armstrong Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

1.09 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials from same production run as products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Quantity: Furnish quantity of flooring units equal to 5% of amount installed.
2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra material.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Resilient tile flooring, wall base, adhesives and subfloor preparation products and accessories:

1. Armstrong Flooring Inc., 2500 Columbia Avenue, Lancaster, PA 17604, www.armstrongflooring.com/commercial
2. Manufacturer must have a headquarters in the United States of America

2.02 RESILIENT TILE FLOORING MATERIALS

A. Provide Natural Creations with Diamond 10 Technology: Luxury Solid Vinyl Tile Flooring manufactured by Armstrong Flooring Inc.

1. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond- infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
2. Reference specification - ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
3. Pattern and Color: in color selected from the range currently available from Armstrong Flooring Inc.
4. Size: [36 in. x 6 in. (914.4 mm x 152.4 mm)] [18 in. x 36 in. (457.2 mm x 914.4 mm)].
5. Wear layer thickness:
0.020 (0.5 mm) 6. Thickness:
1/8"/0.125 in. (3.2mm)

2.03 PRODUCT SUBSTITUTION

A. Substitutions: By approval of Architect and In accordance with 01 25 00 Substitution Procedures

2.04 WALL BASE MATERIALS

A. For top set wall base: Provide [4 in. (10.16 cm)] high Armstrong Flooring Color-Integrated Wall Base with a matte finish, conforming to ASTM F 1861, [Type TV - Vinyl, Thermoplastic] Group 1 - Solid, [Style B – Cove.]

2.05 ADHESIVES

A. Provide Armstrong S-288 Flooring Adhesive under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

2.06 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide Armstrong S-184 Fast-Setting Cement-Based Patch and Underlayment

B. For priming porous substrates to aid in adhesive bond strength and reducing subfloor porosity, provide S-454 Prime Strong™ acrylic primer for porous substrates. For non-porous substrates, provide S-455 Prime Strong™ acrylic primer for non-porous substrates.

C. For creating a moisture barrier, provide S-452 Seal Strong™ two-part moisture mitigation system.

D. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

E. Provide transition/reducing strips tapered to meet abutting materials.

F. Provide threshold of thickness and width as shown on the drawings.

G. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

H. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage or overlap- type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e. moisture tests,

bond test, pH test, etc.).

B. Visually inspect flooring materials, adhesives and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.
C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates regarding conditions existing at the time of installation.

3.03 PREPARATION

A. Subfloor Preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong Flooring S-184 Fast-Setting Cement-Based Patch and Underlayment as recommended by the flooring manufacturer. Refer to Armstrong Flooring Guaranteed Installation Systems manual, F-5061 and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

B. Subfloor Cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate, they must be mechanically removed prior to the installation of the flooring material. Refer to the Armstrong Flooring Guaranteed Installation Systems manual, F-5061 and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

C. When using S-288 Adhesive, perform subfloor moisture testing in accordance with ASTM F 2170, “Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in- situ* Probes” and Bond Tests as described in publication F-5061, "Armstrong Flooring Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Internal relative humidity of the concrete shall not exceed 95%.On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

D. Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

3.04 INSTALLATION OF FLOORING

A. Install flooring in strict accordance with the latest edition of Armstrong Flooring Guaranteed Installation Systems manual, F-5061. Failure to comply may result in voiding the manufacturer's warranty listed in Section 1.08.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built- in furniture and cabinets.

E. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Refer to specific rolling instructions of the flooring manufacturer

F. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.05 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths if practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.

C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

D. Apply [butt-type] [overlap] metal edge strips where shown on the drawings, [before] [after] flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.06 CLEANING

A. Perform initial and on-going maintenance according to the latest edition of Armstrong Flooring Maintenance Recommendations and Procedures manual, F-8663.

3.07 PROTECTION

A. Protect installed flooring as recommended by the flooring manufacturer against

damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See Finishing the Job in the latest edition of Armstrong Flooring Guaranteed Installation Systems manual, F- 5061.)

END OF SECTION 09 65 19

SECTION 09 68 00 - CARPET TILE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes carpet tile and accessories.

1.03 SUBMITTALS

A. Product Data:

1. Printed data sheets for each type of carpet and accessory specified
2. Installation system proposed
3. Care, cleaning, and maintenance information. Include two copies of each of the following CRI publications:

   a. “Steps in the right direction, an Owner’s Manual for Your Carpet” with pertinent treatment highlighted
   b. Carpet Maintenance Guidelines for Commercial Applications
   c. Take a Deep Breath and Thank Your Custodian; Tips and Tools for Improving IAQ in Schools

4. Smoke and flammability reports

B. Shop Drawings:

1. Working layout for each area to be covered showing the location of seams
2. Show pattern, color, trim units, and other pertinent installation details
3. Maintenance training video

C. Samples:

1. Manufacturers standard color books of actual samples
2. Manufacturers standard trim chain
3. Three 12-inch by 12-inch samples of actual carpet selected
4. Three 12-inch long strips of trim units

D. Certifications and Testing:

1. Certification by independent testing laboratory addressed to the City of Leesburg, stating

   materials used meet or exceed the requirements of the Florida Building Code 6th Edition (2017).

a. Include a notarized statement from the carpet manufacturer that the sample tested was taken from an actual roll of material supplied to this Project.

2. Provide certification that tile has been manufactured in accordance with the Contract Documents.
3. Test results of the Bond and Moisture tests
4. Test results from the Calcium Chloride tests Sample Warranty

1.04 QUALITY ASSURANCE

A. Contractor's Qualifications:

1. Employ only experienced installers, skilled in installation of the specified systems.
2. Installation company will employ a minimum of three qualified installers with a minimum of three years' experience each of installing similar systems.

B. Manufacturer's Qualifications:

1. Employ only manufacturers making the specified materials as a current production item.
2. Manufacturers shall have a minimum of five years of production experience with carpet of similar types to that specified.

C. Source Limitations: Obtain carpet from a single source, unless otherwise directed by Architect.

D. Install carpet after building is enclosed, wet work complete, and HVAC system operational.

1. Maintain temperature and humidity at designed level for the remainder of the construction period.

E. Carpeting shall have a minimum critical radiant flux of 0.45 watts per square centimeter (radiant panel test) per ASTM E-648 "Standard Test Methods for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source."

F. Carpet Fire-Test-Response Characteristics: Provide carpeting with the following characteristics as determined by testing identical products per test method indicated below by U.L. or another nationally recognized testing laboratory acceptable to the authorities having jurisdiction. Identify carpet with appropriate markings of applicable agency.

1. Surface Flammability: Passes CPSC 16 CFR, Part 1630
2. Flame Spread 25 or less per ASTM E 84
3. Smoke Development: 450 or less per ASTM E 84
4. Static: Under 3.5 kv. Below the average level of human sensitivity

G. Adhesives: VOC levels shall comply with Section 07920 – Sealants.

H. Carpet shall have been tested against and passed the Indoor Air Quality Carpet Testing Program requirements of CRI.

I. Calcium Chloride Test: Measure moisture vapor emissions from concrete slab prior to the installation of the carpeting. Maximum moisture emissions levels shall be as recommended by the carpeting manufacturer. Bond and Moisture Tests: Provide bond and moisture tests prior to the installation of the carpet. Tests shall be in accordance with the carpet manufacturer's

recommendations. Provide amount of tests as recommended by the carpet manufacturer.

J. The Architect may send samples of questionable materials, taken at random from the jobsite, to an independent testing laboratory. The cost of testing shall be borne by the contractor if the material is found not to be as specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in the original factory packaging, labeled with identification of manufacturer, brand name, lot number, and test data.

B. Store materials on site, in original packaging, inside a well ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity.

1.06 PROJECT CONDITIONS

A. Dimensions supplied in these Specifications and Drawings are approximate. Field verify dimensions and other conditions affecting Work.

1.07 EXTRA STOCK

A. Two percent of the amount installed for each type and color carpet used. Deliver in full width units.

B. Owner shall have first right of refusal of carpet remnants for attic stock.

1.08 WARRANTIES

A. Manufacturer's Warranty:

1. Warranty shall be non-prorated against surface pile wear, zippering, edge ravel, excessive static, loss of resiliency, tough bind, moisture barrier (passes British Spill Test), and delamination of secondary backing.
2. Surface pile wear for warranty purposes shall be no more than 10% loss of face fiber.
3. Warranty shall be for a minimum of twenty years.

B. Installer's Warranty: Guarantee the installation against defects in workmanship, seaming, and loss of adhesion for a period of three years.

C. Warranties shall begin on the date of Substantial Completion.

D. Upon written notice from the Architect, correct or replace improper work and material that may become apparent within the warranty period. Repairs will be made in accordance with this specification.

1. Exception: Any problems arising from improper adherence to the manufacturer's recommended maintenance program.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product and Manufacturer; as indicated on the Finish Schedule, subject to compliance with requirements other acceptable Manufacturers offering products which may be incorporated into the work are:

1. Milliken & Company.
2. Tandus; a Tarkett Company.

2.02 MATERIALS

A. Carpet shall have been tested against and passed the Indoor Air Quality Carpet Testing Program requirements of CRI.

B. Colors and patterns will be selected from the manufacturer's standard combination by the Architect. Architect may select more than one color, and this proposal shall not be conditional upon minimum order of yardage in any single color that may be selected.

2.03 MATERIALS

A. Carpet shall have been tested against and passed the Indoor Air Quality Carpet Testing Program requirements of CRI.

B. Vinyl Carpet Trims: Shall be by Johnson Rubber Co. Colors as selected by Architect. Provide edge type as follows:

1. Carpet to VCT: CTA-XX-A by Johnsonite
2. Carpet Termination Reducer. EG-XX-W Johnsonite

C. Adhesive shall be as recommended by carpet manufacturer

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Examine substrate for compliance with the Contract Documents. Do not proceed until unsatisfactory conditions have been corrected.

B. Remove coatings, including curing compounds, dust, dirt, solvents, soaps, silicone, wax, oil, grease, paint, plaster, and other substances that are incompatible with adhesives. Allow floors to dry. Apply sealer to prevent dusting.

C. Ensure concrete floors are free from cracks, ridges, depressions, scaling and irregularities.

D. Ensure constant floor height after installation with a maximum variation of 1/4-inch per 10 feet non-cumulative in any direction.

3.02 INSTALLATION

A. Install carpet system in accordance with manufacturer's recommendations.

1. Carpet coverage shall be complete to edges of space and free of gaps between tiles and at bases of permanent fixtures within designated areas.
2. Install using direct glue-down method. Comply with CRI 104, Section 8, Direct Glue- Down Installation

B. Check matching of carpet before cutting and ensure no visible variation between dye lots.

C. Cut carpet in a maner to allow proper seam and pattern match. Ensure cuts are straight, true, and not frayed.

D. Adhesive: Prime substrate as recommended by adhesive manufacturer. Spread adhesive at stipulated rates for full adhesion.

E. Lay Carpet with pile running in same direction as anticipated traffic.

1. Do not change pile run in any one room or from one room to the next where continuous through a wall opening.
2. Align lines of carpet as woven, using no fill strips less than 12-inches wide.

F. Seams:

1. Locate where shown on approved Shop Drawings or where specifically approved by Architect.
2. Locate to the maximum extent possible out of traffic.
3. Center seams occurring at doors, running parallel to door, directly under the door unless specified otherwise.
4. Seams occurring at corridor change shall follow wall line parallel to carpet direction.
5. Ensure seams are straight, not overlapped, and free of gaps and bird mouths.

G. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and build-in furniture including casework, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by manufacturer.

H. Install edging strips where carpet terminates at other floor coverings. Use full-length pieces only. Where splicing cannot be avoided, butt ends tight and flush.

I. Roll carpet to remove air bubbles.

J. Do not place heavy objects such as furniture on carpeted areas for a minimum of 24-Hours after completed installation or until adhesive is set.

K. All scrap carpet shall be returned to the Owner.

3.03 CLEANING AND PROTECTION

A. All scrap carpet shall be palletized and returned to the manufacturer.

B. Immediately after installation, remove visible cement, dirt, wrappings, cartons, clippings, and

other foreign substances. Vacuum carpet.

C. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer until the Date of Substantial Completion.

D. Schedule and conduct an instruction class for the Owner's maintenance staff prior to the Date of Substantial Completion.

1. Instruct personnel on the proper method of cleaning the material as recommended by the manufacturer.
2. DVD record this session.

END OF SECTION 09 68 00

SECTION 09 72 00 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Vinyl wall covering.
2. Textile wall covering.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

C. Samples: For each type of wall covering and for each color, texture, and pattern required.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

2. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 265 and complying with Method A test protocol in IBC 2000, Section 803.5.1.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate appearance and aesthetic effects and set quality standards for installation.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 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. Rolls of Wall-Covering Material: Full-size units equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 WALL-COVERING PRODUCTS

A. General: Provide rolls of each type of wall covering from the same run number or dye lot.

B. Manufacturer and Products: See Interior Design Drawings.

2.2 ACCESSORIES

A. Adhesive: Mildew-resistant, non-staining adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer.

B. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall-covering manufacturer for intended substrate.

C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
3. Check painted surfaces for pigment bleeding. Sand gloss, semi-gloss, and eggshell finish with fine sandpaper.

B. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

C. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

D. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer.

3.2 INSTALLATION

A. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

B. Install strips in same order as cut from roll.

C. Install reversing every other strip.

D. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

E. Match pattern 72 inches above the finish floor.

F. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.

G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

H. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

END OF SECTION 09 72 00

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SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Galvanized metal.
2. Steel and iron
3. Aluminum.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.2 Manufacturers:

A. Acceptable manufacturers:

1. Pittsburgh Paints.
2. Benjamin Moore Co.
3. Duron Paint Co.
4. ICI Dulux
5. Porter Paint Co.
6. Sherwin-Williams Co.

B. Paints and finishes shall be supplied by a single manufacturer. Paint thinners and tints shall be products of same manufacturer as paints or approved by paint manufacturer for use with his products. Shellac, turpentine, patching compounds and similar materials execution of work shall be pure, best quality products.

C. Gloss / Sheen:

1. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following ***MPI*** gloss / sheen standard values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 maximum
G2	Velvet finish	10 maximum	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 minimum
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

2. Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Portland Cement Plaster: 12 percent.
6. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 EXTERIOR PAINTING SCHEDULE

A. Galvanized-Metal Substrates:

1. Latex Over Water-Based Primer System: MPI EXT 5.3H.

a. Prime Coat: Waterborne galvanized-metal primer.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex semi-gloss.

B. Steel and Iron Substrates:

1. Quick-Dry Enamel System: MPI EXT 5.1A.

a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
b. Intermediate Coat: alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (MPI Gloss Level 5) MPI #81

C. Aluminum Substrates:

1. Water-Based Light Industrial Coating System MPI EXT 5.4G:

a. Prime Coat: Primer, quick dry, for aluminum**,** MPI #95.

b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.

c. Semigloss Topcoat: Light industrial coating, exterior, water based, semigloss (MPI Gloss Level 5)**,** MPI #163.

D. Concrete Substrates, Nontraffic Surfaces:

1. Latex System: MPI EXT 3.1A.

a. Prime Coat: Primer, Alkali resistant, water based MPI #3.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex semi-gloss (MPI Gloss Level 5) MPI#11

E. Portland Cement Plaster Substrates:
1. Latex System: MPI EXT 9.1J.
a. Prime Coat: Primer, Alkali resistant, water based MPI #3.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex semi-gloss (MPI Gloss Level 5) MPI#11

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete floor sealer.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Wood.
6. Gypsum board.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each finish and for each color and texture required.

1. Submit samples on rigid backing, 8-inches (200 mm) square.
2. Step coats on samples to show each coat required for system.
3. Label each coat of each sample.
4. Label each sample for location and application area.

C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings 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. Source Limitations: Obtain block filler and primers for each coating system from the same manufacturer as the finish coats.

C. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

D. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. As shown in Finish Schedule provide products by Sherwin Williams as a basis of design or pre-approved equal as determined by the architect.

B. PAINT, GENERAL

C. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. Restricted Components: Paints and coatings shall not contain any of the following:

    a. Acrolein.
    b. Acrylonitrile.
    c. Antimony.
    d. Benzene.
    e. Butyl benzyl phthalate.
    f. Cadmium.
    g. Di (2-ethylhexyl) phthalate.
    h. Di-n-butyl phthalate.
    i. Di-n-octyl phthalate.
    j. 1,2-dichlorobenzene.
    k. Diethyl phthalate.
    l. Dimethyl phthalate.
    m. Ethylbenzene.
    n. Formaldehyde.
    o. Hexavalent chromium.
    p. Isophorone.
    q. Lead.
    r. Mercury.
    s. Methyl ethyl ketone.
    t. Methyl isobutyl ketone.
    u. Methylene chloride.
    v. Naphthalene.
    w. Toluene (methylbenzene).
    x. 1,1,1-trichloroethane.
    y. Vinyl chloride.

E. Colors: As shown on Finish Schedule.

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E2.

B. Epoxy Block Filler: MPI #116.

1. VOC Content: E Range of E1.

2.3 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI #4.

1. VOC Content: E Range of E2.

2.4 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

2.5 METAL PRIMERS

A. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E2.

B. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

2.6 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

2.7 LATEX PAINTS

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 1.5.

B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).

1. VOC Content: E Range of E3.
2. Environmental Performance Rating: EPR 3.

C. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

1. VOC Content: E Range of E3.

2.8 EPOXY PAINTS (Provide 2 part only)

A. Epoxy Cold CuredGloss: MPI #77 (Gloss Level 6).

1. VOC Content: E Range of E2.

B. Interior/Exterior Epoxy (Water Based): MPI #115.

1. VOC Content: E Range of E2.

2.9 FLOOR COATINGS

A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99

1. VOC Content: E Range of E2.

2.10 Gloss / Sheen:

.1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following ***MPI*** gloss / sheen standard values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 maximum
G2	Velvet finish	10 maximum	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 minimum
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

.2 Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Concrete Substrates: Remove release agents, curing compounds, efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer’s written instructions.

1. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry and vacuum before painting.

D. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer’s written instructions.

E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

1. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
2. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and tough up with same primer as the shop coat.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promise adhesion of subsequently applied paints.

G. Wood Substrates:

1. Scrape and clean knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood. Prime edges, ends, faces, undersides and back sides of wood, including cabinets, counters, cases, and paneling.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. San smooth when dried.
5. Backprime paneling on interior partitions where masonry, plaster or other wet wall construction occurs on back side.
6. Seal tops, bottoms and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

I. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

J. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of durable paint film.
5. Provide finish coats that are compatible with primers used.

6. The term "exposed surfaces" includes areas visible when permanent or built-in-fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
7. Plant interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
8. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
9. Sand lightly between each succeeding enamel or varnish coat.

K. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

L. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

M. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

N. Provide “Wet Paint” signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

O. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System: MPI INT 3.2G.

a. First Coat: Interior/exterior clear concrete floor sealer (water based).
b. Topcoat: Interior/exterior clear concrete floor sealer (water based).

B. CMU Substrates:

1. Latex System: MPI INT 4.2A.

a. Prime Coat: Interior/exterior latex block filler.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Latex, interior, semi-gloss(MPI Gloss Level 5) MPI#54.

2. Epoxy System: MPI INT 4.2G.

a. Prime Coat: Epoxy block filler.
b. Intermediate Coat: Epoxy cold cured gloss matching topcoat.
c. Topcoat: Epoxy cold cured (gloss).

C. Steel Substrates:

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

a. Prime Coat: Quick-drying alkyd metal primer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex (semi-gloss).

2. Alkyd Dry-Fall System: MPI INT 5.1D.

a. Prime Coat: Shop primer specified in Section where substrate is specified.
b. Topcoat: Dry fall, alkyd, flat, MPI #55.

D. Galvanized-Metal Substrates:

1. Latex System: MPI INT 5.3A.

a. Prime Coat: Cementitious galvanized-metal primer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex (semi-gloss).

E. Dressed Lumber Substrates: Including doors.

1. Latex System: MPI INT 6.3T.

a. Prime Coat: Interior latex-based wood primer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex (semi-gloss).

F. Gypsum Board Substrates:

1. Latex System: MPI INT 9.2A.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex (flat) at ceiling applications and (low sheen) at wall applications.

2. Epoxy System: MPI INT 9.2F.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Interior/Exterior Epoxy matching topcoat.
c. Topcoat: Interior/Exterior Epoxy (gloss).

G. Gypsum Board Substrates to receive wallcovering:

1. Latex System:

a. Prime Coat: PVA Interior Latex Primer & Sealer

END OF SECTION 09 91 23

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Interior Substrates:
   a. Dressed lumber (finish carpentry or woodwork).
   b. Wood-based panel products.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

B. Samples: For each type of finish system and in each color and gloss of finish required.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on mockups.

a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

Stain Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates, Exposed Framing: Wood trim, architectural woodwork, and wood board paneling.

1. Semitransparent Stain System[**MPI 6.2L**]:

a. Prime Coat: Stain, exterior, solvent based, semitransparent, matching topcoat.
b. Topcoat: Stain, exterior, solvent based, semitransparent[**, MPI #13**].

3.6 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Wood trim, architectural woodwork, and wood board paneling.

1. Semitransparent Stain System[**MPI INT 6.3C**]:

a. Prime Coat: Stain, exterior, solvent based, semitransparent, matching topcoat.
b. Topcoat: Stain, exterior, solvent based, semitransparent[**, MPI #13**].

2. Water-Based Varnish over Stain System[**MPI INT 6.3W**]:

a. Stain Coat: Stain, semitransparent, for interior wood[**, MPI #90**].

b. First Intermediate Coat: Water-based varnish matching topcoat.
c. Second Intermediate Coat: Water-based varnish matching topcoat.
d. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4)[**, MPI #128**].

3. Water-Based Varnish System[**MPI INT 6.3Q**]:

a. Prime Coat: Water-based varnish matching topcoat.
b. Intermediate Coat: Water-based varnish matching topcoat.
c. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4)[**, MPI #128**].

4. Alkyd Varnish System[**MPI INT 6.3J**]:

a. Prime Coat: Alkyd, sanding sealer, clear[**, MPI #102**].

b. Intermediate Coat: Varnish matching topcoat.

c. Topcoat: Varnish, interior, semi-gloss (MPI Gloss Level 5)[**, MPI #74**].

5. Polyurethane Varnish System[**MPI INT 6.3K**]:

a. Prime Coat: Polyurethane varnish matching topcoat.
b. Intermediate Coat: Polyurethane varnish matching topcoat.

c. Topcoat: Varnish, interior, polyurethane, oil modified, satin (MPI Gloss Level 4)[**, MPI #57**].

6. Moisture-Cured Clear Polyurethane System[**MPI INT 6.3X**]:

a. Prime Coat: Moisture-cured polyurethane matching topcoat.
b. Intermediate Coat: Moisture-cured polyurethane matching topcoat.
c. Topcoat: Varnish, polyurethane, moisture cured, gloss (MPI Gloss Level 6)[**, MPI #31**].

7. Clear, Two-Component Polyurethane System[**MPI INT 6.3Z**]:

a. Prime Coat: Two-component polyurethane matching topcoat.
b. Intermediate Coat: Two-component polyurethane matching topcoat.
c. Topcoat: Varnish, aliphatic polyurethane, two component (MPI Gloss Level 6 or MPI Gloss Level 7)[**, MPI #78**].

8. Danish Oil System[**MPI INT 6.3M**]:

a. Prime Coat: Danish oil matching topcoat.
b. Topcoat: Danish oil[**, MPI #92**].

B. Wood Substrates: [**Wood paneling**] [**and**] [**casework**].

1. Semitransparent Stain System[**MPI INT 6.4C**]:

a. Prime Coat: Stain, exterior, solvent based, semitransparent, matching topcoat.
b. Topcoat: Stain, exterior, solvent based, semitransparent[**, MPI #13**].

2. Water-Based Varnish over Stain System[**MPI INT 6.4U**]:

a. Stain Coat: Stain, semitransparent, for interior wood[**, MPI #90**].

b. First Intermediate Coat: Water-based varnish matching topcoat.
c. Second Intermediate Coat: Water-based varnish matching topcoat.
d. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4)[**, MPI #128**].

3. Water-Based Varnish System[**MPI INT 6.4M**]:

a. Prime Coat: Water-based varnish matching topcoat.
b. Intermediate Coat: Water-based varnish matching topcoat.
c. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4)[**, MPI #128**].

4. Alkyd Varnish over Stain System[**MPI INT 6.4D**]:

a. Stain Coat: Stain, semitransparent, for interior wood[**, MPI #90**].

b. First Intermediate Coat: Alkyd, sanding sealer, clear[**, MPI #102**].

c. Second Intermediate Coat: Varnish matching topcoat.

d. Topcoat: Varnish, interior, semi-gloss (MPI Gloss Level 5)[**, MPI #74**].

5. Alkyd Varnish System[**MPI INT 6.4G**]:

a. Prime Coat: Alkyd, sanding sealer, clear[**, MPI #102**].

b. Intermediate Coat: Varnish matching topcoat.

c. Topcoat: Varnish, interior, semi-gloss (MPI Gloss Level 5)[**, MPI #74**].

6. Polyurethane Varnish over Stain System[**MPI INT 6.4E**]:

a. Stain Coat: Stain, semitransparent, for interior wood[**, MPI #90**].

b. First Intermediate Coat: Polyurethane varnish matching topcoat.
c. Second Intermediate Coat: Polyurethane varnish matching topcoat.
d. Topcoat: Varnish, interior, polyurethane, oil modified, satin (MPI Gloss Level 4)[**, MPI #57**].

7. Polyurethane Varnish System[**MPI INT 6.4J**]:

a. Prime Coat: Polyurethane varnish matching topcoat.
b. Intermediate Coat: Polyurethane varnish matching topcoat.
c. Topcoat: Varnish, interior, polyurethane, oil modified, satin (MPI Gloss Level 4)[**, MPI #57**].

8. Moisture-Cured Clear Polyurethane over Stain System[**MPI INT 6.4V**]:

a. Stain Coat: Stain, semitransparent, for interior wood[**, MPI #90**].

b. First Intermediate Coat: Moisture-cured polyurethane matching topcoat.
c. Second Intermediate Coat: Moisture-cured polyurethane matching topcoat.
d. Topcoat: Varnish, polyurethane, moisture cured, gloss (MPI Gloss Level 6)[**, MPI #31**].

9. Danish Oil System[**MPI INT 6.4K**]:

a. Prime Coat: Danish oil matching topcoat.
b. Topcoat: Danish oil[**, MPI #92**].

END OF SECTION 09 93 00

SECTION 10 14 00 - DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Signage of the following types:
   1. FABRICATED LETTERS
   2. CUT ALUMINUM LETTERS

1.2 RELATED SECTIONS

A. Section 04 26 13 – Masonry Veneer

1.3 REFERENCES

A. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's illustrated product literature and specifications to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Submit detailed drawings of products and assemblies.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer to have a minimum of 20 year experience in manufacturing letters.

B. Installer Qualifications: Minimum 2 year experience installing similar products.

C. Sourcing: All signage shall be manufactured by one manufacturer.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Handle materials to avoid damage.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty against defects in materials and workmanship. Letters shall be guaranteed for the life of the business against defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
Advanced Sign Solutions, Attn: Adam Kimball, 7518 McElvey Road, Panama City Beach, FL 32408 TEL: (850) 914-9925.
Email: kimball@adv-signs.com

Boardwalk Designs, Atttn: Joe Paffoon, 1312 Louisiana Ave, Lynn Haven, FL 32444 TEL: (850) 265-0988 Email: joe@boardwalkdesigns.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

1.2 FABRICATED LETTERS

A. Fabricated Letters: Dimensional letters for main, ‘Complex’ sign, EC1
1. Material: Aluminum

B. Design:
1. Letter shall be Minion Pro Regular letter style and shall be 18 inches high, as indicated on the drawings.
2. Finishes:
Satin paint to match Mathews Paint, MP32071, White Wonder
3. Character Depth: 2 inches depth or per manufacturer’s standard.

C. Fabrication:
1. Fabricated letters shall be between .080 inch to 0.125 inch (2 mm to 3 mm) thick with returns typically .063 (1.5 mm) thick.
2. Precision-guided lasers or routers for cut letters, logos or shapes are acceptable.
3. Letter returns shall be cut to size based on the desired letter depth and bent to the contour of the cut faces to produce a hollow-backed letter with 90 degree angle edges and hand-soldered using a lead-free silver solder or machine produced.
4. Welds shall be tested to withstand temperatures below -40 degree F (-38 degree C) and exceeding 350 degree F (177 degree C).
5. The edges of faces on letters and logos with thin lines of exposed stainless steel shall be buffed smooth on polished letters, or stroke sanded on satin letters to maintain consistency in appearance.

D. Mounting:
1. Mounting shall be templated designating stud locations required for mounting on substrate surface as indicated.
2. Brackets shall be soldered on the inside of the letters to receive threaded studs.
3. Standard fabricated letters shall use 3/16 inch (4.8 mm) aluminum studs.

4. Concealed Studs: Concealed (blind), threaded studs 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.
5. Letters to be mounted 3/4” off the face of the sign masonry to provide for internally illuminated ‘halo look’.

1.3 CUT ALUMINUM

A. Cut aluminum numerals for Main Monument Sign, EA1 and Main Complex Sign, EC1
   1. Material: Aluminum
   2. Design: Numeral shall be Rajdhani Semibold letter style and shall be 8 inches high, as indicated on the drawings.
   3. Color to match Williams Paint TBD
   4. Numeral to be ¼” depth

B. Mounting: Numerals to be mounted to masonry substrate with high bond silastic adhesive.

PART 2 EXECUTION

2.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

2.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship to adjacent construction.

2.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 14 00

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SECTION 10 14 16 - PLAQUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal plaques.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plaques.

1. Include fabrication and installation details and attachments to other work.
2. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements**, including raised characters and Braille**, and layout for each plaque at least **half size**.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.

1. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in **the USDOJ's "2010 ADA Standards for Accessible Design"**.

2.2 METAL PLAQUES

A. Cast Plaque : Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Basis of Design: A.R.K. Ramos
2. Plaque Thickness: **0.50 inch (12.7 mm)**.
3. Finishes: A.R.K. Ramos “Echo Brass”
    a. Integral Metal Finish: Mill finish raised surface with dark oxidized background.
    b. Overcoat: Manufacturer's standard baked-on clear coating
4. Background Texture: Stipple
5. Integrally Cast Border Style: A.R.K. Ramos #500
6. Mounting: Rosette-head through fasteners, A.R. K. Ramos No. 3

2.3 MATERIALS

A. Aluminum Castings: ASTM B85/B85M, alloy recommended by manufacturer and finisher for finish indicated.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Exposed Metal-Fastener Components, General:
    a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
3. Plaque Mounting Fasteners:
    a. Through Fasteners: Exposed metal fasteners matching plaque finish, with type of head indicated, installed in predrilled holes.

B. Adhesive: As recommended by plaque manufacturer.

1. Silicone adhesive

2.5 FABRICATION

A. General: Provide manufacturer's standard plaques according to requirements indicated.
   1. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

PART 3 - EXECUTION

3.1 INSTALLATION OF METAL PLAQUES

A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.

   1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
   2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
   3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:

   1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
      a. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

   2. Through Fasteners: Drill holes in substrate using predrilled holes in plaque as template. Countersink holes in plaque if required. Place plaque in position and flush to surface. Install through fasteners and tighten.
   3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of plaque and of suitable quantity to support weight of plaque after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as plaque is applied and to prevent visibility of cured adhesive at plaque edges. Place plaque in position, and push to engage adhesive. Temporarily support plaque in position until adhesive fully sets.

C. Remove temporary protective coverings and strippable films as plaques are installed.

END OF SECTION 10 14 16

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SECTION 10 14 29 - MODULAR SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular signs.

1.2 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 01 22 00 "Unit Prices."

1. Unit prices apply to authorized work covered by quantity allowances.
2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.3 ACTION SUBMITTALS

A. Product Data: Modular signs.

B. Product Data Submittals:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Shop Drawings: For modular signs.

1. Include plans, elevations, sections, and mounting details.
2. Show message list, typestyles, graphic elements**,** including raised characters and Braille, and layout for each sign at least half size.

D. Samples for Initial Selection: For each type of modular sign, exposed component, and exposed finish.

1. Include typestyles and graphic symbols.

E. Samples for Verification: For each type of modular sign showing each component and with the required finishes, in manufacturer's standard size unless otherwise indicated and as follows:

1. Modular Signs: Sample, Not less than 12 inches (300 mm) square, including corner .

F. Product Schedule: For modular signs. Use same designations indicated on Drawings or specified.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 MODULAR SIGNS

A. Sign System: Sign with removable inserts for graphics and copy attached to a receiver frame system using clips, splines, or comparable method.

1. Sign Size: As indicated on signage documents.
2. Provide tamper-resistant feature requiring special tool to change inserts.
3. Backer Panel: Backer panel mounted behind modular signage system as indicated on signage documents.
4. Double-Faced Signs: Provide signs with two faces back-to-back for signs suspended from ceiling or mounted perpendicular to wall, and as indicated.

B. Inserts:

1. Module Height: As indicated on signage documents.
2. Type: As indicated on signage documents.

C. Graphics and Copy:

1. Surface Applied: Exterior and non-ADA compliant signs to be direct print.
2. Raised, ADA Compliant: Manufacturer's standard.
3. Text and Typeface: As indicated on signage documents

D. Mounting: Mount modular signs to wall surfaces and sign cabinets using manufacturer's standard method.
1. Perpendicular Wall Mount: Provide aluminum bracket designed to support signs perpendicular to wall surface, and to suit mounting conditions. Attach with concealed screws or other method capable of supporting weight of sign..

E. Accessories: Provide user-changeable insert feature where indicated.

2.3 MATERIALS

A. Aluminum Extrusions: ASTM B221 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on face; die cut to form copy indicated on Drawings.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined. Use concealed fasteners and anchors unless indicated to be exposed.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

D. Magnetic Tape: Sign type G : Manufacturer's standard magnetic tape with adhesive on one side.

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 unacceptable. 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.

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 the 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install signs using mounting methods indicated and in accordance with manufacturer's written instructions.

B. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

C. Accessible Signage: Install in locations on walls as indicated on Drawings and in accordance with the accessibility standards.

D. Clean substrate of to remove materials that would adversely affect bond. Use materials and quantities sufficient to support weight of sign after cure without slippage. Keep adhesives and tapes away from edges to prevent visibility at sign edges.

3.3 ADJUSTING AND CLEANING

A. Touch up factory-applied finishes to restore damaged or soiled areas.

B. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 10 14 29

SECTION 10 21 13.50 - GLASS TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Glass panel compartment partitions for the following applications:
a. Toilet enclosures.
b. Urinal screens.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM B 86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.
4. ASTM B 221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
5. ASTM D6578 / D6578M - Standard Practice for Determination of Graffiti Resistance
6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. International Code Council (ICC)/American National Standards Institute (ANSI):
1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

C. United States Department of Justice:
1. ADA - Americans with Disabilities Act, Excerpt from 28 CFR Part 36 - ADA Standards for Accessible Design.

D. GREENGUARD Environmental Institute (GREENGUARD):
1. GREENGUARD certified low emitting products.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for each type of product indicated. Include fabrication details, description of materials and finishes.
1. Product Test Reports: When requested by Architect, submit documentation by qualified independent testing agency indicating compliance of products with requirements.

B. Shop Drawings: Include overall product dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.

C. Samples for Selection: Furnish samples of manufacturer's full range of colors for initial selection.

D. Samples for Verification: Furnish physical sample of material in selected color.
   1. Size: 4 by 11 inches (275 by 100 mm) minimum, in type of finish specified.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance and cleaning instructions.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum five years' experience in the manufacture of toilet compartments. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:
   1. Design and Aesthetic Compliance: Product design features that mimic BOD design aesthetic.
   2. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
   3. Samples of each component of product specified.
   4. List of successful installations of similar products available for evaluation by Architect.

B. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum three years.

C. Source Limitations: Obtain toilet compartment, screens and accessories from single manufacturer.

D. Accessibility Requirements: Comply with requirements of ICC/ANSI 117.1, and with requirements of authorities having jurisdiction.

E. Indoor Environmental Quality Certification: Provide certificate indicated that products have been certified under the following programs, or a comparable certification acceptable to Owner:
   1. GREENGUARD Indoor Air Quality Certified.
   2. GREENGUARD Certified for Children and Schools.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are in operation.
   1. Deliver toilet compartments in manufacturer's original packaging.
   2. Store in an upright condition.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:
   1. Glass Toilet Partitions: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of **Bradley Corporation, Menomonee Falls, WI 53051**.
   1. Contact Information: (800)272-3539, fax (262)251-5817; Email info@BradleyCorp.com; Website: www.bradleycorp.com.

2.2 DESIGN

A. Modern minimalist design with flush surface construction and hidden headrail.
   1. Scratch-proof, tempered glass with ceramic screen printing fitted to stainless steel connecting brackets and fittings. A stainless steel headrail runs along the top recessed 4.6 inches (118 mm). Each dividing wall uses 6 brackets to connect to the front panel secured using flush-fitting, stainless steel rosettes. Three stainless steel brackets connect the panel to the wall.
   2. Glass panels shall be 100% recyclable.
   3. Standard height of 85.1 inches (2162 mm) including the 1.9 inches (50 mm) floor clearance.

2.3 MATERIALS

A. Panels, Doors and Pilasters:
   1. Constructed from scratch-proof, tempered glass with ceramic screen printing that is resistant to stains and corrosion. Corners shall be polished smooth for aesthetic and safety purposes.
   2. Surface Burning: Not tested or rated.
   3. Impact Resistant: Not tested or rated.
   4. Scratch Resistant: ASTM D6578.

B. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.

C. Stainless Steel Castings: ASTM A 743/A 743M.

D. Aluminum: ASTM B 221.

2.4 GLASS TOILET COMPARTMENTS

A. Toilet Compartment Type:
   1. Overhead braced.
      a. Basis of Design Product: **Bradley Corporation, Euro Style, Series LUCENT**

B. Privacy Screen Type:
   1. Floor anchored.
      a. Basis of Design Product: **Bradley Corporation, Euro Style, Series LUCENT**.

C. Urinal Screen Style:
   1. Wall hung/ floor supported:
      a. Basis of Design Product: **Bradley Corporation, Euro Style, Series LUCENT**.

2.5 CONSTRUCTION

A. Panels, Doors & Pilasters;
   1. 0.4 inches (10 mm) thick and constructed from tempered glass that is resistant to stains and corrosion. All corners are polished smooth. Doors include an individual coat hook and door bumper.
   2. Adjustable floor feet shall maintain panels 1.9 inches (50 mm) above finished floor.

B. Headrail: Extruded anodized aluminum headrail profile. Provide clamps for attachment to panel and stainless steel brackets to secure to wall.

C. Feet: Constructed of stainless steel.

D. Brackets (Fittings): Stirrup Type: U-brackets; stainless steel.

E. Urinal-Screen Construction: Matching toilet compartment panel construction.
   1. Urinal-Screen Feet: Manufacturer's standard floor feet design with panel matching the pilaster and secured to wall.

F. Privacy Screen Type: Matching toilet compartment panel design and construction.
   1. Privacy-Screen Feet: Manufacturer's standard floor feet design with panel matching the pilaster and secured to wall.

2.6 FINISH

A. Provide panels, pilasters and doors with the following color(s):
   1. SEE DRAWINGS – INTERIOR MATERIAL FINISH SCHEDULE.

2.7 HARDWARE

A. Hardware: Manufacturer's standard stainless steel castings, including corrosion-resistant, tamper-resistant fasteners:
   1. Hinge: Self-closing (hydraulic) hinges available featuring a soft-close function, ensuring a silent close.
   2. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall.
   3. Door Latch: Stainless steel door knob. Inside door knob has an easy-to-maneuver paddle built into the locking wheel. White/red indication latch and emergency release feature is integrated on the outside of the door knob. The emergency

release uses a 5/32 inch (4 mm) Allen key that is inserted into the center of the door knob from the outside to unlock the door.

4. Door Pull: Stainless steel, thru-bolt (each side) on ambulatory and accessible compartment doors and where scheduled or indicated.

2.8 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions.

B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant feet anchoring assemblies with leveling adjustment at bottoms of panel.

C. Door Size and Swings: Unless otherwise indicated, provide 30 inches wide, in-swinging doors for standard toilet compartments. 36-inches (914 mm) wide compartments without-swinging doors with a minimum 32 inches (813-mm-) wide clear opening for compartments designated as accessible or ambulatory.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.

1. Proceed with installation once conditions meet manufacturer's requirements.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install unit rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.

C. Stirrup Brackets: Secure panels to walls with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on doors [and doors in privacy screens] to return doors to fully closed position.

3.4 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION 10 21 13.50

SECTION 10 26 00 - CORNER GUARDS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Corner guards.
2. Wall Protection at Mop Sinks.

1.02 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For each type of wall protection showing locations and extent.

C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

D. Samples for Verification: For each type of exposed finish on the following products, prepared on

1. Corner Guards: 12 inches long. Include example top caps.

E. Material Certificates: For each type of exposed plastic material.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.04 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch-long units.

2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store wall protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

a. Store corner-guard covers in a vertical position.

1.06 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations: Obtain wall protection products of each type from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

2.03 CORNER GUARDS

A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. Basis-of-Design Product: Basis of Design Product and Manufacturer, as indicated on the Finish Material List, subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. InPro Corporation
    b. Korogard Wall Protection Systems; a division of RJF International Corporation.
    c. Pawling Corporation.

2. Continuous Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum.
3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.04 MOP SINK WALL PROTECTION

A. Fiberglass Reinforced Plastic panels on walls above mop sink.

1. Thickness 0.100”
2. Height 96”
3. Finish: Medium Gray Embossed Class C

B. Seal all edges with Clear Sanitary Sealant See Section 07 92 00 “Joint Sealants.”

2.05 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D 256, Test Method A.

C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.06 FABRICATION

A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.07 FINISHES

A. Protect 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.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.

B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Complete finishing operations, including painting, before installing wall protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
3. Adjust end and top caps as required to ensure tight seams.

3.04 DECORATIVE WALL COVERINGS INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
3. Adjust end and top caps as required to ensure tight seams.

3.05 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 26 39

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SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Public-use washroom accessories.
2. Custodial accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule:

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products by Bobrick Washroom Equipment, Inc. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. Bradley Corporation..

B. See drawings for schedule of accessories.

2.2 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: The design for accessories is based on products by Bobrick Washroom Equipment, Inc. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. Bradley Corporation.

B. See drawings for schedule.

2.3 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

END OF SECTION 10 28 00

SECTION 10 42 60 - SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior signage of the following types:
   1. Acrylic Signage.

1.2 REFERENCES

A. ICC/ANSI A117.1 - Accessible and Useable Buildings and Facilities.

B. USATBCB - Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).

1.3 SUBMITTALS

A. Submit under provisions of Division One.

B. Product Data: Manufacturer's descriptive literature.

C. Shop Drawings: List sign styles, lettering, locations and dimensions of each interior sign.

D. Selection Samples: One complete set of color chips representing manufacturer's full range of available colors.

E. Verification Samples: Two full size samples, representing type, style and color specified including method of attachment.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of ICC/ANSI A117.1 and ADAAG.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inspect products upon receipt. Store products in manufacturer's packaging until ready for installation.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. **Advanced Sign Solutions**, Attn: Adam Kimball, 7518 McElvey Road, Panama City Beach, FL 32408 TEL: (850) 914-9925.
Email: kimball@adv-signs.com

2. Boardwalk Designs, Atttn: Joe Paffoon, 1312 Louisiana Ave, Lynn Haven, FL 32444 TEL: (850) 265-0988 Email: joe@boardwalkdesigns.com

B. Requests for substitutions will be considered in accordance with provisions of Division One.

2.2 SIGNS

A. All signs to be ADA-Compliant

2.3 INTERIOR SIGNAGE SCHEDULE

A. Manufacturer's standard tactile plaque constructed utilizing individual painted and/or metal laminated acrylic panels with applied tactile text and grade II braille. .

1. Style: Custom
2. Material: Cut acrylic with digital printing and tactile text and braille
3. Sign Thickness: As specified within signage documents
4. Tactile Characters/Symbols: Raised 1/32 inch (1 mm) from sign plate face
5. Construction: multiple-piece; added on or engraved characters are not acceptable.
6. Lettering Style: As specified within signage documents
7. Braille: Grade 2 braille, placed directly below last line of letters or numbers
8. Contrast: Letters, numbers and symbols shall contrast with background.
9. Bevel Options: N/A
10. Profiles: Custom
11. Color of Background: Custom Color, As specified within signage documents
12. Color of Text and Raised Characters: As specified within signage documents
13. Surface finish: Matte

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine installation areas to ensure that conditions are suitable for installation.

B. Examine signage for defects prior to installation. Do not install damaged signage.

3.2 PREPARATION

A. Verify mounting heights and locations for interior signage will comply with referenced standards.

B. Clean mounting locations of dirt, dust, grease or similar conditions that would prevent proper installation.

3.3 INSTALLATION

A. Install signs level, plumb, without distortion, and in proper relationship with adjacent surfaces using manufacturer's recommended standard mounting system.
   1. Mount with concealed ‘fasteners’; Double stick foam tape

B. Remove adhesive from exposed sign surfaces as recommended by manufacturer.

C. Clean signs after installation as recommended by manufacturer.

D. Replace damaged products before Substantial Completion.

3.4 INTERIOR SIGNAGE SCHEDULE

A. See drawings for locations and amounts.

END OF SECTION 10 42 60

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SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS.

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.

2.2 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. JL Industries, Inc.; a division of the Activar Construction Products Group. #2023 is basis of design.
    c. Larsens Manufacturing Company.

B. Cabinet Construction: Nonrated..

C. Cabinet Material: Aluminum sheet.

D. Semi-Recessed Mounted Cabinet:

E. Cabinet Trim Material: Same material and finish as door.

F. Door Material: Aluminum sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Laminated float glass (clear).

I. Accessories:

1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters or Decals.
3) Lettering Color: As selected by Architect from full range of industry colors and color densities.
4) Orientation: Vertical.

J. Materials:

1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221 for extruded shapes.

a. Finish: Baked enamel or powder coat.
b. Color: As selected by Architect from full range of industry colors and color densities.

2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 2 (tinted, heat absorbing, and light reducing), bronze tint.

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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

B. Install fire-protection cabinets in locations and at mounting heights indicated

1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.
2. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply decals or 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 10 44 13

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SECTION 10 44 16 - 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. 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 (6) 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 the following:

    a. Oval Fire Products; shallow profile fire extinguishers installed within cabinets are model 10JABC and 10HPKP or pre-approved equals.

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.
3. All portable fire extinguishers shall be tested, serviced and maintained in accordance with NFPA 10, 1994. LSC 7-7.4, 1.3.13.1.

    a. All fire extinguishers shall be serviced, sealed and tagged by a certified fire extinguisher company.

B. General: Provide fire extinguishers of type, size and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Valves: Manufacturer’s standard.
2. Handles and levers: Manufacturer’s standard.

C. Multipurpose Dry-Chemical Type: UL-rated 4-A: 80-BC, 10-lb nominal capacity, with mono-ammonium phosphate-based dry chemical in manufacturer's standard enameled container.

D. Purple-K Dry-Chemical Type: UL-rated 10-B:C, 10-lb nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets (where required when located without a cabinet): Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Oval Fire Products.

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 (if required). See drawings for fire extinguisher cabinets) 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 10 44 16

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10 53 00 - METAL CANOPIES

Part 1 - General

1.1 Description of work

A. Work in this section includes furnishing and installation of extruded aluminum overhead hangar rod style & cantilevered style canopies and associated materials to provide a complete system.

B. Related Sections include the following:

1. Division 5 Section "Metal Fabrications" for steel supporting metal canopies.
2. Division 5 Section "Cold-Framed Metal Framing" for secondary support framing supporting metal canopies.
3. Division 7 Section "Sheet Metal Flashing and Trim" for fasciae, copings, flashings and other sheet metal work not part of the metal canopy assemblies.
4. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this section.

1.2 Quality Assurance

A. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc. Lincoln, Nebraska 1-888-273-1132.

1.3 Field Measurement

A. Confirm dimensions prior to preparation of shop drawings.
B. Supply manufacturer's standard literature and specifications for canopies.
C. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly signed and sealed by a Florida Licensed Engineer.

1.4 Performance Requirements

A. All products shall meet Florida Product Approval Certification requirements.
B. See structural for design pressures.
C. Provide with shop drawings designs for supplemental framing to support metal canopies. See Division 5 for additional requirements.

1.5 Delivery, Storage, and Handling

A. Deliver and store all canopy components in protected areas.

Part 2 - Products

2.1 Manufacturer

A. Mapes Industries, Inc.
Lincoln, Nebraska
Phone: 1-888-273-1132
Fax: 1-877-455-6572 - or pre-approved equal.

2.2 Materials

A. Decking to be 3"x 6” x .078 Super-Lumideck extruded flat soffit decking
B. Fascia shall be standard 8" extruded "G" style (minimum .125 aluminum)
C. Hangar rods and attachment hardware shall be powder coated to match canopy.
D. Decking and fascia shall be extruded aluminum, alloy 6063-T6, in profile and thickness per manufacturer.

2.3 Finishes

A. High Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.4 Fabrication
A. All connection shall be mechanically assembled utilizing 3/16" fasteners with a minimum shear stress of 350lb. Pre-welded or factory-welded connections are not accepted.
B. Decking shall be designed with interlocking extruded aluminum members with mechanical fasteners field applied to provide structural integrity for the completed assembly.
C. Concealed Drainage. Water shall drain from covered surfaces into integral rear gutter and directed to ground level discharge via one downspout,

2.5 Supplemental Framing
A. Included all supplemental steel framing necessary to support and attach metal canopies per shop drawings, wall conditions and manufacturer's recommendations.

Part 3 - Execution

3.1 Inspection
A. Coordinate with all trades prior to closing of building envelope to facilitate the insulation of supplemental steel support members.
B. Confirm that surrounding area is ready for the canopy installation.
C. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.
D. Erection shall be performed by an approved installer and scheduled after all concrete, masonry, and roofing in the area is completed.

3.2 Installation
A. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.3 After installation, entire system shall be left in a clean condition.

END OF SECTION 10 53 00

SECTION 10 75 29 - PLAZA-MOUNTED FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plaza-mounted flagpoles made from aluminum.

B. Owner-Furnished Material: Flags.

C. Related Requirements:

1. Section 26 41 13 "Lightning Protection for Structures" for connecting plaza-mounted metal flagpoles to lightning protection system.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For each flagpole.

1. Include the following:

a. Plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
b. Details of plaza-mounted connections and mountings, including setting drawings, templates and directions for installing anchorages that are to be embedded in concrete or masonry.

C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.

D. Delegated Design Submittals: For flagpoles.

1. Include loads, point reactions, and locations for attachment of flagpoles.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.

B. Structural Performance: Flagpole assemblies, including anchorages and supports, to withstand design loads indicated within limits and under conditions indicated.

1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is per Structural Drawings.
2. Base flagpole design on n**ylon or cotton** flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: **Cone**-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

1. Basis of Design: Liberty Flagpoles
   9 Commerical Dr. Unit D
   Hampden MA 01036
   Phone: 800-314-2392
   Email: support@libertyflagpoles.com

B. Exposed Height: **30 feet (9 m)** & **35 feet (11 m)**. See drawing for locations.

C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

D. Cast-Metal Shoe Base: Made from aluminum **with same finish and color as flagpoles** for anchor-bolt mounting; furnish with anchor bolts.

1. Furnish connector to building's lightning protection system conductor.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.

B. Internal Halyard, Winch System: Manually operated winch with control-stop device and removable handle, stainless steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.

1. Plastic Halyard Flag Clips for Internal Halyard, Winch System: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

B. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Section 079200 "Joint Sealants."

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

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 the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Baseplate: Install baseplate on washers placed over leveling nuts on 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.

C. Mounting Brackets and Bases: Anchor brackets and bases securely to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 10 75 29

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SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. See Drawings for Appliances

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Residential Appliances: Comply with NAECA standards.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Washing Machine: Five-year limited warranty for parts.
2. Dryer: Five-year limited warranty for parts.

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. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product approved by the Architect.

2.2 FABRICATED EQUIPMENT

A. Stainless-Steel Sinks: Specified in Section 22 00 60 Plumbing Fixtures and Trim.

2.3 FOOD WASTE DISPOSER

A. Food Waste Disposer Units:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Insinkerator “Evolution Excel” by Emerson Appliance Solutions or comparable product approved by the Architect.

2.4 COOKING EQUIPMENT

A. Microwave Ovens:

1. Built-in Model:
   a. Basis-of-Design Product: See Drawings for models.

2.5 REFRIGERATION EQUIPMENT

A. Combination Refrigerator/Freezer:

1. Basis-of-Design Product: See Drawings for models.

2.6 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C 920; silicone. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

1. Public Health and Safety Requirements:

   a. Sealant is certified for compliance with NSF standards for end-use application indicated.
   b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

2. Cylindrical Sealant Backing: ASTM C 1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.7 FINISHES

A. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

    a. Run grain of directional finishes with long dimension of each piece.
    b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Powder-Coat Finishes: 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. Install appliances level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain equipment.

END OF SECTION 11 31 00

SECTION 11 33 00 - RETRACTABLE STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manual disappearing stairways.

1.2 REFERENCES

A. ANSI A14.9: Safety Requirements for Ceiling Mounted Disappearing Climbing Systems.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings for Stairs:
1. Plan and section of stair installation.
2. Indicate rough opening dimensions for ceiling and/or roof openings.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store stairway until installation inside under cover in manufacturer's unopened packaging. If stored outside, under a tarp or suitable cover.

1.5 WARRANTY

A. Limited Warranty: One year against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Precision Ladders, LLC, P. O. Box 2279; Morristown, TN 37816-2279; Tel: 423-586-2265; Fax: 423-586-2091; www.PrecisionLadders.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MANUAL DISAPPEARING STAIRWAY.

A. Manual Disappearing Stairway.
1. Standard Model: Super Simplex Disappearing Stairway as manufactured by Precision Ladders LLC. Stairs for ceiling heights 7'-0" – 12'-0": Model 1000 (ceiling height in inches).

B. Performance Standard: Unit shall comply with ANSI A14.9, Commercial Type, for rough openings between 27 inches to 39 inches. Stairway capacity shall be rated at 500 lbs.

C. Accessories:
1. Steel pole to aid opening and closing stairways.
2. Stairs for ceiling heights 9' -10" – 12' -0" shall be equipped with a patented Precision Fold Assist to aid in folding and unfolding of sections.
3. Keyed lock for door.

D. Components:
1. Ceiling Opening
   a. Ceiling heights from 9' 10" – 12' 0" require opening of 30" x 64"
2. Stairway Stringer: 6005-T5 Extruded aluminum channel 5" x 1" x 1/8"; tri-fold design; steel blade type hinges; adjustable feet with plastic Mar-guard. Pitch shall be 63°.
3. Stairway Tread: 6005-T5 extruded aluminum channel 5 3/16 inches by 1 1/4 inches by 1/8 inch. Depth is 5 3/16 inches. Deeply serrated top surface. Riser Height: 9-1/2 inches. Clear Tread Width for Standard Width: 18 inches.
4. Railing: Aluminum bar handrail riveted to stringers, upper section only.
5. Frame:
   a. When ceiling to floor (or roof deck) above is 12" or greater, the frame shall be 1/8" steel, 63° (with built-in steps) on the hinge end, 90° on the other end, custom depth to fill distance from ceiling to floor above. This custom frame will require a longer opening in the floor above than is required at the ceiling level.
6. Door Panel
   a. Standard (non-fire rated) door shall be constructed of 1/8 inch (3 mm) aluminum sheet attached to stairway frame with a steel piano hinge. Door overlaps bottom flange of frame. Eye bolt accommodates pole for opening and closing door.
7. Hardware:
   a. Steel blade type hinge connecting stringer sections. Zinc plated and chromate sealed.
   b. Steel operating arms, both sides. Zinc coat with clear trivalent chromate.
   c. Double acting steel springs and cable, both sides.
   d. Rivets rated at 1100 lb (499 kg) shear strength each.
   e. Steel section alignment clips at stringer section joints.
   f. Molded rubber guards at corners of aluminum door panel.
8. Finishes: Mill finish on aluminum stairway components. Prime coat on frame.

2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until rough opening and structural support have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 11 33 00

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SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

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. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. Wood trim, 8 inches long.
3. One full-size solid surface material countertop, with front edge and backsplash, 8 by 10 inches, of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. See Interior Design drawings for Material selected.
2. Type: Provide Standard type unless Special Purpose type is indicated.
3. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
4. Colors and Patterns: As selected by Architect from manufacturer's full range.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch- thick, solid surface material.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

F. Joints: Fabricate countertops without joints.

G. Cutouts and Holes:

1. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color

to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

D. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

E. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

F. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

SECTION 12 36 61 19 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops.
2. Quartz agglomerate backsplashes.
3. Quartz agglomerate end splashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, necessary joint locations, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. Cambria:
   Address: 31496 Cambria Avenue Le Sueur, MN 56058
   Phone: 1-866-Cambria (226-2742)
   Website: www.cambriausa.com

2. Silestone:
   355 Alhambra Circle, Suite 1000
   33134
   Coral Gables, (Florida) USA
   +1 786 686 5060
   +1 877 532 6394
   CS@cosentino.com
   www.cosentino.com
   https://www.silestoneusa.com/

3. Wilsonart Americas
   2501 Wilsonart Drive
   P.O. Box 6110
   Temple, Texas 76503-6110

(800) 433-3222
https://www.wilsonart.com/

2.2 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

B. Colors and Patterns: See Interior Finish and Material Schedule for Types.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.3 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: **Premium**.
2. Front: **Straight, slightly eased at top**,
3. Backsplash: **Straight, slightly eased at corner**.
4. End Splash: **Matching backsplash**.

B. Countertops: 3 cm..

C. Backsplashes:2 cm or 3 cm.

D. Joints: Design intention, **Fabricate countertops without joints**. If joints are necessary indicate locations on shop drawings.

E. Joints: Fabricate countertops in sections for joining in field**, with joints at locations acceptable to the Architect**.

F. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures **in shop** using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

G. Plywood Subtops: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.4 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer.

B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

C. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions.

D. Align waterfall edges with book matching patterns.

E. Space joints with 1/16-inch gap for filling with sealant. Use temporary shims to ensure uniform spacing.
   1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

G. Install backsplashes and end splashes by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splashes for filling with sealant. Use temporary shims to ensure uniform spacing.

H. Install aprons to backing and countertops with adhesive.

I. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

J. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 12 36 61 19

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SECTION 14 21 23.16 - MACHINE-ROOM-LESS ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Electric Traction Elevators.

B. Products Supplied but Not Installed Under this Section:

1. Hoist Beam
2. Pit Ladder
3. Inserts mounted in block walls for rail attachments

C. Work Supplied Under Other Sections:

1. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
2. Main line disconnects for each elevator.
    a. One fused three phase permanent power in building electrical distribution room
3. Hoistway ventilation shall be in accordance with local and national building code requirements.
4. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
5. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
6. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
7. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
8. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.

D. Related sections:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 015000 – Temporary Facility and Controls
3. Section 033000 - Cast-in-Place Concrete:

4. Section 042000 - Unit Masonry
5. Section 055000 - Metal Fabrications
6. Section 071600 - Cementitious Waterproofing
7. Section 230000 - Heating, Ventilating, and Air Conditioning
8. Section 260000 - Electrical
9. Section 263000 - Electric Power Generating and Storing Equipment
10. Section 273000 - Voice Communications
11. Section 283100 - Fire Detection and Alarm
12. Section 310000 – Earthwork

E. Industry and government standards:

1. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
2. ADAAG - Accessibility Guidelines for Buildings and Facilities
3. ANSI/NFPA 70, National Electrical Code
4. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows
5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.

1.2 DESCRIPTION OF ELEVATOR

A. Elevator Equipment: MonoSpace® 300 gearless traction elevator
B. Equipment Control: KCM831
C. Drive: Non Regenerative
D. Quantity of Elevators: 1 Elevator
E. Landings: 2
F. Openings: 2 Front Openings, 0 Back Openings
G. Travel: 17’ 0”
H. Rated Capacity: 3,500 lb
I. Rated Speed: 150 FPM
J. Clear Inside Dimensions: (W x D) 6' 5 11/16" x 5' 6 11/16"
K. Cab Height: 9'-2"
L. Clear height under suspended ceiling: 9'-0"
M. Entrance Width and Type: 42" and Center Opening
N. Entrance Height: 8'-0"
O. Main Power Supply: 480 V Volts + 5%, three-phase
P. Operation: Simplex
Q. Machine Location: Inside the hoistway mounted on car guide rail
R. Control Space Location: Integrated control
S. Elevator Equipment shall conform to the requirements of seismic zone: Non-Seismic
T. Maintenance Service Period: 12 Months

1.3 PERFORMANCE REQUIREMENTS

A. Car Performance

1. Car Speed ± 5% of contract speed under any loading condition or direction of travel.

2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.

B. System Performance

1. Vertical Vibration (maximum): ISO 18738/ISO 8041 system pk-pk 15 mg
2. Horizontal Vibration (maximum): ISO 18738/ISO 8041 system pk-pk 12 mg
3. Jerk Rate (maximum): 1 m/s^3
4. Acceleration (maximum): 0.4 m/s^2
5. In Car Noise: 55 dB(A) Maximum
6. Leveling Accuracy: ±0.2 inches
7. Starts per hour (maximum): 180

1.4 ACTION SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit manufacturer's product literature for each proposed system.

1. Cab design, dimensions and layout.
2. Layout, finishes, and accessories and available options.
3. Controls, signals and operating system.
4. Color selection charts for cab and entrances.

C. Shop Drawings:

1. Clearances and travel of car.
2. Clear inside hoistway and pit dimensions.
3. Location and layout of equipment and signals.
4. Car, guide rails, buffers and other components in hoistway.
5. Maximum rail bracket spacing.
6. Maximum loads imposed on building structure.
7. Hoist beam requirements.
8. Location and sizes of access doors.
9. Location and details of hoistway door and frames.
10. Electrical characteristics and connection requirements.

D. Samples: For each type of exposed finish involving color selection.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway and pit layout and dimensions, as indicated on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data:

1. Provide manufacturer's standard maintenance and operation manual.

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one (1) year maintenance agreement, starting on date initial maintenance service is concluded.

D. Diagnostic Tools

1. Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed.

   This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner. Any diagnostic tool provided to the Owner by the Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment and parametric software changes which are available to the Elevator Contractor.

   In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the competed project During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner.

   The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor.
   Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

1.7 QUALITY ASSURANCE

A. Manufacturer: Minimum of fifteen years' experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.
B. Installer: The equipment manufacturer shall install the elevator.
C. Inspection and Testing: In accordance with requirements of local jurisdiction, obtain required permits, inspections and tests.

1.8 DELIVERY, STORAGE AND HANDLING

A. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible for the cost of storage at an approved facility. Additional labor costs for double handling will be the responsibility of the General Contractor.

B. Delivered elevator materials shall be stored in a protected environment in accordance with manufacturer recommendations. A minimum storage area of 10 feet by 20 feet is required adjacent to the hoistway.

1.9 COORDINATION

A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

1.10 WARRANTY

A. Provide manufacturer warranty for a period of one year. The warranty period is to begin upon final acceptance of the Contract. Warranty covers defects in materials and workmanship. Damage due to ordinary use, vandalism, improper or insufficient maintenance, misuse, or neglect do not constitute defective material or workmanship.

B. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five year from date of Substantial Completion after initial 12 month warranty.

1.11 MAINTENANCE SERVICE

A. The elevator manufacturer shall provide maintenance service consisting of regular examinations and adjustments of the elevator equipment for a period of 12 Months after date of final acceptance.

Predictive maintenance shall be included for the full maintenance period. This service must be capable of using AI-based analytics to identify potential equipment issues and notifying the elevator provider via an internet connection. Coordinate with Owner’s IT team.

Replacement parts shall be produced by the original equipment manufacturer.

B. Maintenance service to be performed during regular working hours of regular working days and shall include emergency call back service during regular working hours.

C. Maintenance service shall not include adjustments, repairs or replacement of parts due to

negligence, misuse, abuse or accidents.

D. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 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 at rated speed and capacity.

E. Contractor to provide a continuing maintenance agreement for a total of 5 years to start after the initial 12 month warranty/maintenance period commences.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Provide AC gearless machine room-less elevator systems subject to compliance with the design and performance requirements of this specification. Elevator manufacturers may include but are not limited to one of the following:

1. Basis of Design: MonoSpace® 300 traction elevators by KONE, Inc. (www.kone.com).
2. Otis Elevator Co.
3. ThyssenKrupp Elevator.
4. Other acceptable machine room-less products: manufacturer with minimum 15 years' experience in manufacturing, installing, and servicing elevators of the type required for the project. See specification section 01 25 00 – Substitution Procedures for further requirements. **NO SUBSTITUTIONS AFTER BID.**

B. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for full and complete system from a **single source manufacturer.**

2.2 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE

A. Controller: Provide microcomputer-based control system to perform all functions.

1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed and physically segregated from the rest of the controller.
3. Provide a serial cardrack and main CPU board containing a non- erasable EPROM and operating system firmware.
4. Variable field parameters and adjustments shall be contained in a non- volatile memory module.

B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.

C. Controller Location: Locate controller{s} in the front wall integrated with the top landing

entrance frame, machine side of the elevator. One non-fused three phase permanent power in hoist way at top landing. A separate control space should not be required.

2.3 EQUIPMENT: HOISTWAY COMPONENTS

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway

B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.
C. Buffers, Car and Counterweight: Polyurethane buffer.
D. Hoistway Operating Devices:

1. Emergency stop switch in the pit

2. Terminal stopping switches.

3. Emergency stop switch on the machine

E. Positioning System: System consisting of magnets and proximity switches.
F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.4 EQUIPMENT: HOISTWAY ENTRANCES

A. Hoistway Entrances

1. Sills: Extruded Extruded or machined metal, with grooved surface, 1/4 inch thick.

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 or powder-coated steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.

3. 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**.

   a. Fire-Protection Rating: 1 1/2 hour with 30-minute temperature rise of **450 deg F.**

4. Entrance Finish: Brushed Stainless Steel.
5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

2.5 EQUIPMENT: CAR COMPONENTS

A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.
B. Car Safeties: Device will be provided and mounted under the car platform, securely bolted

to the Car Frame. The safety will be actuated by a centrifugal governor mounted at the top of the hoistway. The Safety is designed to operate in case the car attains excessive descending speed.

C. Platform: Platform shall be all steel construction.

D. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.

E. Car Wall Finish:

1. Side Walls: Studio Teak Laminate (L414)

2. Rear Wall: Studio Teak Laminate (L414)

3. Car front, Door and Skirting: Brushed Stainless Steel.

4. Ceiling: Round, LED spotlights CL 80 Brushed Stainless Steel

5. Handrails: Brushed Stainless Steel

   a. Rails to be located on rear of car enclosure.

6. Sills: Aluminum extruded.

F. Cab Wall Protection Pads to be included.

G. Flooring: By others. Floor prepared to receive floor finish as identified. See Specification Section 09 31 13 ‘Ceramic Tiling” and Interior Design Drawings for T-1 finish.

H. Emergency Car Signals

1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.

2. Emergency Car Lighting: Provide emergency power unit employing a 12- volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.

3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

I. Ventilation Fan Efficiency: Not less than 3.0 cfm/W.

J. Light Fixture Efficiency: Not less than 35 lumens/W. Provide KSS570 Light Fixture.

K. Provide inspection certificate in each car, mounted under acrylic cover with frame made from Brushed stainless steel.

2.6 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide vandal-resistant buttons and lighted elements illuminated with

LEDs.

B. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation. Fixture finish to be Brushed Stainless Steel

1. Main Flush mounted car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have White Dot Matrix illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be White Dot Matrix. All texts, when illuminated, shall be White Dot Matrix. The car operating panel shall have a Brushed Stainless Steel finish.

2. 24/7 Video Communication shall be included per code – a visual and text based system to integrate with the elevator emergency call button.

3. Additional features of car operating panel shall include:

a. Car Position Indicator within operating panel Brushed Stainless Steel

b. Elevator Data Plate marked with elevator capacity and car number on car top.

c. Help buttons with raised markings.

d. In car stop switch per local code.

e. Call Cancel Button.

f. 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. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. hall fixtures shall have a Brushed Stainless Steel finish.

1. Hall fixtures shall feature round, mechanical, buttons in applied mount face frame. Hall fixtures shall correspond to options available from that landing. Buttons shall be in a vertically mounted fixture.
2. Hall Lanterns: Units will illuminated arrows; but provide single arrows at terminal landings.
3. 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.

D. Car Lantern: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel. The car riding lantern face plate shall have a Brushed Stainless Steel finish.

E. 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.

2.7 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER

A. Elevator Operation

1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

2. Zoned Car Parking.

3. Relative System Response Dispatching.

B. Standard Operating Features to include:

1. Full Collective Operation
2. Fan and Light Control.
3. Load Weighing Bypass.
4. Ascending Car Uncontrolled Movement Protection
5. Top of Car Inspection Station.

C. Additional Operating Features to include:

1. Independent Service.
2. Hoistway Access Bottom Landing.
3. Hoistway Access Top Landing.
4. Car Wall Protection Pads
5. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1/CSA B44, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.
6. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.

D. Elevator Control System for Inspections and Emergency

1. Provide devices within controller to run the elevator in inspection operation.
2. Provide devices on car top to run the elevator in inspection operation.
3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
7. Provide the means for the control to reset elevator earthquake operation.

2.8 EQUIPMENT: DOOR OPERATOR AND CONTROL

A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.

B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.

D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.

E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.

B. Do not proceed with work until unsatisfactory conditions are corrected.

C. Prior to start of work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.

D. Prior to start of work, verify projections greater than two inches (four inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less than 75 degrees from horizontal.

E. Prior to start of work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.

F. Prior to start of work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with

installed elevator equipment.

G. Prior to start of work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including sleeves and penetrations.

H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

3.2 PREPARATION

A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

3.3 INSTALLATION

A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.

B. 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.

C. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.

D. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.

E. Lubricate operating system components in accordance with manufacturer recommendations.

F. Perform final adjustments, and necessary service prior to final acceptance.

G. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

I. Locate hall signal equipment for elevators as follows unless otherwise indicated:

1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.

2. Place hall lanterns either above or beside each Hoistway entrance.

3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.4 CONSTRUCTION

A. Interface with Other Work:

1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.

2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.

3. Ensure adequate support for entrance attachment points at all landings.

4. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.

5. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.

6. Coordinate interface of elevators and fire alarm system.

7. Coordinate interface of dedicated telephone line.

3.5 TESTING AND INSPECTIONS

A. Perform recommended and required testing in accordance with authority having jurisdiction as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

B. Obtain required permits and provide originals to Owner's Representative.

3.6 PROTECTION

A. Temporary Use: General Contractor is to limit temporary use for construction purposes to one elevator. Comply with the following requirements for elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
3. Engage elevator Installer to provide full maintenance service.
4. Engage elevator Installer to 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.

3.7 DEMONSTRATION

A. Prior to final acceptance, Engage a factory-authorized service representative to train Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

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SECTION 21 13 00
BUILDING SPRINKLER SYSTEMS

1 GENERAL

1.1 Drawings and General provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fire protection work is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to Division-2 sections for site fire protection piping and appurtenances; not work of this section.

1.5 Refer to other Division-21 sections for site fire protection piping and appurtenances; not work of this section.

1.6 Refer to Division-9 sections for painting of fire protection piping; not work of this section.

1.7 Refer to Division-26 sections for the following work; not work of this section.

1.7.1 Fire alarm connections for all flow switches, pressure switches, and supervisory (tamper) switches.

1.8 Codes and Standards:

1.8.1 NFPA Compliance: Install fire protection systems in accordance with NFPA 13 "Standard for the Installation of Sprinkler Systems"

1.8.2 UL Compliance: Provide fire protection products in accordance with UL standards; provide UL label on each product.

1.8.3 Fire Department/Marshal Compliance: Install fire protection systems in accordance with local regulations of fire department or fire marshal.

1.8.4 Screw Thread Connections: Comply with local Fire Department/Fire Marshal regulations for sizes, threading and arrangement of connections for fire department equipment to sprinkler systems.

1.9 Experience: Contractor shall have a minimum of ten years continuous experience under their current operating name and license number.

1.9.1 Home Office: The home office for the contractor shall be located within 125 miles of the project site.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Pipe and fittings
Basic pipe supports and hangers
Basic valves
Special valves
Pressure gauges
Automatic sprinklers
Cabinets

1.10.2 Working (Shop) Drawings: Prepare working (shop) drawings of fire protection systems indicating pipe sizes, pipe locations, pipe elevations, fittings, shutoffs, hangers, equipment, and coordination with other building systems. Submittal shall show all requirements per NFPA-13.

1.11 Test Reports and Verification Submittals:

1.11.1 Certificate: Submit certificate of Aboveground Installation upon completion of fire protection piping work which indicates that work has been tested in accordance with NFPA 13 and that system is operational, complete, and has no defects.

1.11.2 Tag: Submit a copy of the sprinkler system tag. The installing fire sprinkler contractor shall be licensed in accordance with State Fire Marshal (SFM) Rule 4A-46. At the conclusion of the project and prior to the final inspection by the SFM the Contractor shall tag the fire sprinkler system in accordance with 4A-46.041.

1.12 O&M Data Submittals:

1.12.1 Record Drawings: At project closeout, submit record drawings of installed fire protection piping and products.

1.12.2 Maintenance Data: Submit a copy of all approval submittals. Submit maintenance data and parts lists for basic valves and special valves. Include these data in O&M manual.

1.12.3 NFPA 25: Provide a copy of NFPA 25 in each O&M Manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems. Where more than one type of material or products are indicated, selection is Installer's option.

2.2 Basic Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

Fire Protection Piping: Plastic pipe markers. Fire piping exposed in mechanical and electrical rooms shall be painted red.

Fire Protection Valves: Plastic or brass valve tags

Fire Protection Signs: Provide the following signs:

At each sprinkler valve, sign indicating what portion of system valve controls and hydraulic design data.

At each auxiliary drain, a sign indicating location.

2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing. Where multiple listings are made for a particular type system, the material is the Installer's option.

2.4 Wet Pipe: Black steel pipe; Schedule 40 for less than 8"; Schedule 30 for 8" and larger. Fittings and joints shall be as follows.

1 Class 125, cast-iron threaded fittings with threaded joints.
2 Mechanical grooved pipe coupling and fittings; cut-groove type with mechanical joints.
3 Wrought steel buttwelding fittings with welded joints.

2.4.1 Wet Pipe: Black steel pipe; Schedule 10 for 5" and smaller; 0.134" wall thickness for 6"; and 0.188" wall thickness for 8" and 10".

1 Class 125, cast-iron threaded fittings with threaded joints, sizes 2½" and larger.
2 Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type with mechanical joints.
3 Wrought steel buttwelding fittings with welded joints.

2.5 Basic Piping Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

2.6 Basic Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors", in accordance with the following listing:

Adjustable steel clevis hangers or adjustable steel band hangers for horizontal-piping hangers and supports.

Two-bolt riser clamps for vertical piping supports.

Steel turnbuckles and malleable iron sockets for hanger-rod attachments.

Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.

2.7 Basic Valves: Provide interior valves complying with Division-23 Basic Mechanical Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Standard Service Code-Required OS&Y Valves: GA-6, GA-7.

2.7.2 Standard Service Sectional Valves: GA-6, GA-7. BF-6, BF-7.

2.7.3 Standard Service Indicating Valves: GA-6, GA-7, BA-6.

2.7.4 Standard Service Trim Valves: GA-6, BA-4.

2.7.5 Standard Service Check Valves: CK-4, CK-5.

2.8 Special Valves:

2.8.1 General: Provide valves, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.8.2 Alarm Check Valve: Provide cast-iron water flow alarm check valve, 175 psi working pressure, with retard chamber.

2.8.3 Hose Outlet Valves: Provide angle hose valves, 2-1/2" size where not otherwise indicated. Provide chrome plated with escutcheons where mounted in cabinet. Provide chain and cap.

2.8.4 Ball Drip Check Valve: Provide fire department connection iron swing check valve, 175 psi rated working pressure, of size and end type indicated, with ball drip.

2.9 Basic Meters and Gauges: Provide meters and gauges complying with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

2.9.1 Pressure gauges, 0-250 psi range.

2.10 Fire Protection Specialties: Provide fire protection specialties, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.10.1 Water Flow Indicators: Provide vane type water flow switches, with adjustable retard.

2.10.2 Supervisory Switches: Provide products recommended by manufacturer for use in service indicated.

2.10.3 Acceptable Manufacturers: Subject to compliance with requirements, provide fire protection specialties of one of the following:

Grinnell Fire Protection Systems Co., Inc.
Grunau Sprinkler Mfr. Co., Inc.
Guardian Fire Equipment, Inc.
Potter Roemer, Inc.
Reliable
Viking Corporation

2.11 Automatic Sprinklers: Provide automatic sprinklers and escutcheons of type indicated on drawings, and in accordance with the following listing. Provide quick response type automatic sprinklers. Provide fusible links for 165°F unless otherwise indicated.

2.11.1 Sprinkler Types

Upright.
Pendant.
Concealed pendent.
Horizontal sidewall.

2.11.2 Finish: White for concealed heads in occupied areas. Chrome- plated for pendant heads in exposed occupied areas. Cast brass for unoccupied areas.

2.11.3 Sprinkler Cabinet and Wrench: Furnish steel, baked red enameled, sprinkler box with capacity to store 10 sprinklers and wrench sized to sprinklers.

2.11.4 Acceptable Manufacturers: Subject to compliance with requirements, provide automatic sprinklers of one of the following:

Central Sprinkler Corp.
Grinnell Fire Protection Systems Co., Inc.
Star Sprinkler Mfg. Co. Inc.
Reliable
Viking Corp.
Tyco

3 EXECUTION

3.1 General: Examine areas and conditions under which fire protection materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer. Any installation, modification, or alteration of the sprinkler system shall be performed only by a person under a certificate of competency issued by the State Fire Marshal.

3.2 Installation of Basic Identification: Install mechanical identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification." Install fire protection signs on piping in accordance with NFPA 13 requirements. Continuously paint exposed fire piping red in mechanical and electrical rooms.

3.3 Installation of Pipes and Pipe Fittings:

3.3.1 General: Install pipes and pipe fittings in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings."

3.3.2 Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.

3.3.3 Coordinate with other work as necessary to interface components of fire protection piping properly with other work.

3.3.4 Install drain piping at low points of piping system. Provide dry drum drips where indicated.

3.3.5 Install sectional valves in inlet piping, at bottom of each riser, and in loops as indicated.

3.3.6 Install fire department connection valves in piping where fire department connections are indicated.

3.3.7 Install water flow indicators where indicated.

3.3.8 Mount supervisory switches on each sectional valve.

3.3.9 Install manual shutoff at each audible alarm station.

3.3.10 Install valved hose connections of sizes indicated, or ¾" size if not otherwise indicated, on sprinkler at ends of branch lines and cross mains and at locations where indicated. The intent is to meet the requirements of NFPA 13 and to achieve a fully drainable system.

3.3.13 Install Inspector's test connection where indicated, or at most remote point from riser.

3.4 Installation of Piping Specialties: Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties."

3.5 Installation of Supports and Anchors: Install supports and anchors, in accordance with Division-23 Basic Mechanical Materials and Methods section, "Supports and Anchors."

3.6 Installation of Valves: Install valves in accordance with Division-23 Basic Materials and Methods section "Valves." Provide valves to isolate each riser and elsewhere as required by NFPA 13 .

3.7 Installation of Meters and Gauges: Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges."

3.8 Installation of Fire Protection Specialties: Install fire protection specialties as indicated, and in accordance with NFPA 13. Furnish wiring requirements to electrical Installer for electrical wiring of supervisory switches.

3.9 Field Quality Control:

3.9.1 Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.

3.9.2 Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 24 hours, at not less than 200 psi or at 50 psi in excess of maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.

3.9.3 Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.

3.10 Cleaning and Inspecting: Clean and inspect fire protection systems in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

3.11 Extra Stock:

3.11.1 Heads: For each style and temperature range required, furnish additional sprinkler heads, amounting to one unit for every 100 installed units, but not less than 5 units of each.

3.11.2 Wrenches: Furnish 2 spanner wrenches for each type and size of valve connection and fire hose coupling. Obtain receipt from Owner that extra stock has been received.

3.12 Owner Instruction: Provide technical services for one 4-hour period to instruct Owner’s personnel in operation and maintenance of building sprinkler systems. Schedule training date with Owner. Provide at least 7-day notice to Engineer and Owner of training date.

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SECTION 21 31 13
ELECTRIC DRIVE FIRE PUMP

PART 1 - GENERAL

1.1 Drawings and General provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-21, 22 and 23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fire pump work is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-21, 22 and 23 sections for fire protection piping and appurtenances not specified herein; not work of this section.

1.5 Refer to Division-3, "Concrete" for pump bases; included as work of this section.

1.6 Refer to Division-9 "Painting" for painting of all piping and devices; not work of this section. All exposed piping in fire pump rooms shall be painted red.

1.7 Refer to Division-26 sections for the following work; not work of this section.

A. Power supply wiring from power source to power connection on pumps. Include disconnects and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

B. Interlock wiring between pumps; and between pumps and field-installed control devices.

C. Fire alarm connections from fire pump controllers.

1.8 Codes and Standards:

A. NFPA Compliance: Install fire pumps in accordance with NFPA 20 "Standard for the Installation of Centrifugal Fire Pumps."

B. UL Compliance: Provide listed fire pumps and products in accordance with UL standards; provide UL label on each product.

C. Fire Department/Fire Marshal Compliance: Install fire pumps in accordance with local regulations of fire department or fire marshal.

D. Screw Thread Connections: Comply with local Fire Department/Fire Marshal regulations for sizes, threading and arrangement of connections for fire department equipment to fire protection systems.

E. National Electric Code: Provide fire pumps, controllers, and products complying

with the National Electric Code, NFPA-70.

1.9 Approval Submittals:

A. Product Data: Submit manufacturer's technical product data, specifications, installation and start-up instructions, and pump characteristic performance curves with selection points clearly indicated. Submit manufacturer's assembly-type drawings for each product indicating dimensions, weight loadings, required clearances, and methods of assembly of components. Verify fire pump rotation is compatible with installation arrangement shown on the drawings.

1. Fire pump
2. Fire pump controller
3. Jockey pump
4. Jockey pump controller
5. Accessories

1.10 Test Reports and Verification Submittals:

A. Certified Test Report: Submit certified factory test results from hydrostatic test and performance tests (capacity, head, efficiency, and brake horsepower). All tests shall be performed in accordance with NFPA-20.

B. Pump Acceptance Test Report: Submit fire pump acceptance test report per NFPA-20.

C. Controller Acceptance Test Report: Submit fire pump controller acceptance test report per NFPA-20.

1.11 O&M Data Submittals:

A. Maintenance Data: Submit a copy of all approval submittals. Submit maintenance data and parts lists for each type of pump and controller, including "trouble-shooting" maintenance guide. Include these data in O&M Manual.

B. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to pumps and controllers. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. Include in O&M Manual.

PART 2 - PRODUCTS

2.1 General: Provide factory-tested pumps, controllers, and related equipment, thoroughly cleaned, and painted prior to shipment. Type, size and capacity of each pump is listed in the schedule on the drawings.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide pumps and controllers of one of the following:

ITT-AC Pump

Aurora
Patterson
Peerless

2.3 Unit Purchase: Pump, driver, jockey pump, controller, and related equipment shall be purchased under a unit contract stipulating compliance with NFPA-20. The pump manufacturer shall be responsible for proper operation of the complete assembly as indicated by field acceptance tests.

2.4 Fire Pump: Provide UL-listed, electric drive, horizontal split case fire pumps with the following performance and features:

A. Performance: The pump shall deliver at least 150% of rated capacity at 65% of rated head. The shutoff pressure shall not exceed 120% of rated pressure.

B. Type: Provide base-mounted, double-suction, bronze-fitted, single stage, centrifugal pump. Provide nameplate.

C. Drive: Provide open drip-proof ball bearing type, continuous duty, AC, induction, squirrel-cage motor. Locked rotor current shall not exceed NFPA-20 limits. Provide flexible coupling, coupling guard, splash guard, and nameplate.

D. Mounting: Provide common base plate with machined registered fits for alignment.

E. Casing: Provide split casings with removable upper half to allow rotating element to be removed without disconnecting flanges.

F. Impellers: Provide cast bronze, enclosed type impellers, dynamically balanced and keyed to shaft.

G. Shaft: Provide steel shaft with replaceable shaft sleeve.

H. Casing Rings: Provide renewable casing wear rings designed so that pressure will seat them to the casing.

2.5 Fire Pump Accessories: Provide the following accessories:

A. Suction and discharge pressure gauges, 3-1/2" diameter, compound for suction duty.

B. Automatic circulation relief valve set less than shut off pressure and provisions for discharge to drain, ¾" size to 2500 gpm.

C. Relief valve and cone. Size per NFPA-20.

D. Eccentric tapered suction reducer.

E. Concentric tapered discharge increaser.

F. Float-operated auto air release for split case pumps.

G. Hose valves, caps, and chains, 2-1/2".

H. Hose valve test manifold with piping connections rated at 750 gpm.

I. Flow measuring device to 1000 gpm.

J. Discharge tees.

2.6 Fire Pump Controller: Provide service-rated, factory-wired and tested, UL-listed fire pump controller, rated for continuous duty, and with short circuit withstand capability per NFPA-20, with the following features:

A. Provide switch, circuit breaker disconnect, locked rotor overcurrent protection, magnetic starter, and pilot light. Provide reduced voltage, primary resistance type starter.

B. Provide automatic transfer switch, UL-listed, electrically operated, mechanically held, rated for motor, with pilot lights, interlocks, and test switch. Provide means for manual operation, supervised isolating switches on the alternate power source, under voltage monitor on all three phases for transfer, and voltage and frequency monitors. Units shall be normal seeking and power seeking.

C. Provide for automatic and manual operation.

D. Provide alarms as required.

E. Mount wiring diagrams and operating instructions on controller. Provide nameplate. Mark controller "FIRE PUMP CONTROLLER". Provide startup service.

F. Provide for sending signals to the fire alarm control panel (by Division 16) to indicate pump running, loss of power, and phase reversal.

2.7 Jockey Pump and Accessories: Provide the following:

A. Centrifugal jockey pump and motor.

B. Relief valve.

C. Factory-wired and tested, service-rated, UL-listed controller with HOA switch, fused disconnect switch, thermal overloads, external reset, magnetic starter, pressure controller, and running time indicator.

PART 3 - EXECUTION

3.1 General: Examine areas and conditions under which fire pump materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Basic Identification: Install mechanical identification in accordance with

Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification".

3.3 Installation of Pipes and Pipe Fittings:

A. General: Install pipes and pipe fittings in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

B. Comply with requirements of NFPA-13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.

C. Install OS&Y valve in the fire pump suction as far from the pump as possible. Do not install ells within 5 pipe diameters of the pump suction and not in the plane parallel to the pump shaft. Sleeve all pipes through the wall or floor with proper clearance.

D. Install OS&Y valve and listed check valve in fire pump discharge. Provide anti-water hammer check valve where indicated.

E. Above grade suction piping shall be galvanized steel.

F. Install hose valve test manifold with OS&Y valve, listed check valve and ball drip.

3.4 Installation of Piping Specialties: Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.5 Installation of Supports and Anchors: Install supports and anchors, in accordance with Division-23 Basic Mechanical Materials and Methods section, "Support and Anchors".

3.6 Installation of Valves: Install valves in accordance with Division-23 Basic Materials and Methods section "Valves".

3.7 Installation of Meters and Gauges: Install meters and gauges in accordance with Division-23 Basic Mechanical Materials and Methods section "Meters and Gauges".

3.8 Install fire pump in accordance with manufacturer's written instructions. Provide reinforced concrete pad, set and level pump, and align pump. Tighten bolts after piping has been connected and grout has set. Installation and alignment shall be performed under the supervision of a factory-trained representative.

3.9 Install jockey pump in accordance with the manufacturer's written instructions. Provide concrete pad, gate valves, and discharge check valve.

3.10 Install controllers in accordance with the manufacturer's written instructions. Locate fire pump and jockey pump controllers as close as practical, and within sight of the respective pumps. Maintain code clearances. Protect controllers from water spray.

3.11 Furnish electrical wiring diagrams and requirements to electrical installer. All electrical

work shall be in accordance with the NEC and NFPA-20.

3.12 Cleaning and Inspecting: Clean and inspect fire protection system in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

3.13 Field Quality Control:

A. Test suction piping per NFPA-24 and discharge piping per NFPA-13.

B. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 24 hours, at not less than 200 psi or at 50 psi in excess of maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints.

C. Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.

3.14 Pump Acceptance Tests: Perform pump flow tests in presence of manufacturer's representative, contractor, Engineer, fire department representative, and Owner. Provide all test equipment and perform tests per NFPA-20. Provide pump acceptance test report.

3.15 Controller Acceptance Tests: Perform controller tests in presence of manufacturer's representative, contractor, Engineer, fire department representative, and Owner. Provide all test equipment and perform tests per NFPA-20. Perform at least 10 automatic and 10 manual operations, each of at least 5 minutes duration. Perform half of the operations on the alternate power source. Test the automatic transfer switch at maximum load by turning off normal power. Tests shall result in at least one hour of pump run time. Provide controller acceptance test report.

3.16 Jockey Pump: Set to maintain 10 psi above fire pump setting.

END OF SECTION 213113

SECTION 22 01 00
PLUMBING GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Plumbing Requirements Section. Provisions of this section apply to work of all Division-22 sections. Provisions of Division-23 Basic Mechanical Requirements Sections apply to work of all Division-22 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one

device if multiple devices are shown on the drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.

1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.

1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.

1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on plumbing drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.

1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.

1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Final Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.

1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.

1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.

1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.

1.9.1.1.6 The electrical design shown on the drawings supports the plumbing equipment basis of design specifications at the time of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this change will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than ¼" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final “Approved” or “Approved as Noted” copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein.. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.

2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.

2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution.

Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the plumbing systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any plumbing equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

3.2.7 Start of work will be construed as acceptance of suitability of work of others.

3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 22. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.10 Record Drawings:

3.10.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

3.10.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.11 Acceptance:

3.11.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

3.11.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

3.11.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:

Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.

3.11.4 Record Drawings: Submit record drawings.

END OF SECTION 220100

SECTION 22 07 00
INSULATION FOR PLUMBING PIPE AND EQUIPMENT

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Materials and Methods Sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Approval Submittals:

1.4.1 Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
Flexible unicellular piping insulation

1.5 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.

2.3 Pipe Insulation Materials:

2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)

2.3.2 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200ºF.)

2.3.3 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.

2.3.4 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.

2.3.5 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

3.1 General:

3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".

3.1.4 Do not apply insulation to surfaces while they are hot or wet.

3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

3.2.1 Insulate the following piping systems (indoor locations):

3.2.1.1 Domestic hot water, 180° F: up to 2" pipe - 1½" thick, over 2" pipe 2" thick.

3.2.1.2 Domestic hot and tempered water, up to 140° F: up to 3" pipe - 1½" thick, over 3" pipe - 2" thick.

3.2.1.3 Storm water piping above ceilings including roof drain body - ½" thick.

3.2.2 Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.

3.2.3 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.

3.2.4 Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

3.3 Flexible Unicellular Pipe Insulation:

3.3.1 Insulate the following piping systems:

3.3.1.1 Horizontal above-grade waste piping receiving condensate from air conditioning units to points of connection receiving waste from 4 or more fixtures - ½" thick.

3.3.1.2 Horizontal above grade waste piping receiving discharge from ice machines, coolers, freezers or similar units to points of connection receiving waste form 4 or more fixtures - ½" thick.

3.3.1.3 Floor drain bodies located above ceiling or above grade and receiving condensate from air conditioning units.

3.3.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.

END OF SECTION 220700

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SECTION 22 11 13
POTABLE WATER SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.

1.5 Refer to other Division-22 sections for site water distribution system; not work of this section unless noted.

1.6 Refer to appropriate Division-2 sections for exterior potable water system; not work of this section unless noted.

1.7 Insulation for potable water piping is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:

1.7.1 Domestic hot water and hot water return piping

1.8 Excavation and backfill required in conjunction with water piping is specified in other Division-23 sections, and is included as work of this section.

1.9 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Valves
Strainers
Hose bibbs
Wall hydrants
Water hammer arresters
Meters and gauges
Relief valves
Trap primers
Access doors

1.11 Test Reports and Verification Submittals:

1.11.1 Disinfection: Submit report by Health Department.

1.12 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves, trap primers. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Florida Building Code-Plumbing where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".

2.4 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.4.1 Interior Water Piping:

2.4.1.1 Above Grade: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.

2.4.1.2 Below Grade: Copper tube; Type L, soft-annealed temper; no joints below floor.

2.4.2 Exterior Water Piping:

2.4.2.1 Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.

2.4.3 Solder joints shall be made with 95-5 solder.

2.5 Piping Specialties: Provide piping specialties complying with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".

2.6 Supports and Anchors: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".

2.7 Interior Valves: Provide valves complying with Division-22 Basic Plumbing Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Sectional and Shutoff Valves: GA1, GA2, GA3, BA1, BA2.

2.7.2 Drain Valves: GA1, GA2, BA1, BA2.

2.7.3 Throttling Valves: BA1, BA2.

2.7.4 Check Valves: CK1, CK2, CK3.

2.8 Hose Bibbs: Provide rough nickel plated hose bibbs with lock shield compression stop and loose key removable handle, solid flange, female connection with ¾" male threaded hose end, and straight line type non-removable vacuum breaker with ¾" male threaded hose end. Acorn 8121 RCP or equal model by Woodford or Zurn.

2.9 Wall Hydrants: Provide complete bronze body hose bibbs inside stainless steel box with hinged access door with cylinder lock and “WATER” stamped on cover. Provide with vacuum breaker. Provide key operated control valve with all bronze interior parts, replaceable seat washer, screwdriver operated stop valve in supply, and 3/4” male threaded hose connection. Zurn Z1350 or equal by Acorn or Woodford.

2.10 Water Hammer Arresters: Provide bellows type water hammer arresters, stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201. Precision Plumbing Products, Josam, Zurn, Amtrol, Wade, Jay R. Smith, or approved equal.

2.11 Meters and Gauges: Provide meters and gauges complying with Division-22 Basic Plumbing Materials and Methods section "Meters and Gauges", in accordance with the following listing:

Thermometers
Pressure gauges
Calibrated balancing cocks

2.12 Combined Pressure-Temperature Relief Valves: Provide relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code. Provide bronze body, test lever and thermostat complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210°F, and pressure relief at 150 psi. Watts, Cash, Zurn, or approved equal.

2.13 Trap Primers (TP-1): Provide brass trap primers and distribution units to seal floor drains indicated on drawings. Trap primer valves shall be automatic, self contained type with no springs or diaphragms and shall not require adjustment. Trap primer valves shall be the type that can be installed anywhere on cold water piping. Distribution units shall supply 1-4 floor drains. Trap primer valves shall comply with ASSE 1018. Precision Plumbing Products PR-500, or approved equal. Where P-trap primers are indicated use "Prime-Eze" by Jay R. Smith, or approved equal. Refer to plumbing drawings for locations.

2.14 Access Doors: Provide access doors to service all valves and other devices as required in accordance with Division-23 Basic Mechanical Materials and Methods

Section “Access Doors”.

3 EXECUTION

3.1 General: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Install plumbing identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification". Install underground plastic pipe markers during backfill, 6"-8" below grade.

3.3 Install water distribution piping in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.3.1 Install piping with 1/32" per foot (¼%) downward slope towards drain point.

3.3.2 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.4 Install exterior water piping in compliance with local governing regulations. Water piping shall be installed with a minimum of 30 inches of cover unless otherwise indicated.

3.5 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.6 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.7 Install valves in accordance with Division-23 Basic Mechanical Materials and Methods section "Valves".

3.7.1 Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.

3.7.2 Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.

3.7.3 Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain potable water system.

3.7.4 Check Valves: Install where indicated.

3.8 Hose Bibbs and Wall Hydrants: Install on concealed piping where indicated with vacuum breaker. Mount 18 inches above grade or finished floor.

3.9 Install meters and gauges in accordance with Division-23 Basic Mechanical Materials

and Methods section "Meters and Gauges".

3.10 Install relief valves on each water heater, and where indicated in accordance with the manufacturer's instructions. Pipe full size outside or to floor drain. Cut the end of the pipe at a 45° angle and terminate 6 inches above the floor or grade.

3.11 Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.12 Plumbing Equipment Connections: Connect hot and cold water piping system to plumbing equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.

3.13 Install water hammer arresters in upright position, in locations and of sizes indicated in accordance with PDI Standard WH-201.

3.14 Install trap primers as indicated, and in accordance with manufacturer's installation instructions. Provide access panels to all trap primers unless accessible through a lay-in ceiling or inside mechanical room.

3.15 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-23 Basic Mechanical Materials and Methods section “Access Doors”.

3.16 Piping Tests: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION 221113

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SECTION 22 13 16
SOIL, WASTE, AND VENT SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.

1.5 Refer to appropriate Division-2 sections for exterior sanitary sewer system required in conjunction with soil and waste systems; not work of this section.

1.6 Insulation for soil and waste systems is specified in other Division-22 sections, and is included as work of this section. Insulation requirements include:

1.6.1 Horizontal above grade waste pipes receiving discharge from ice machines, coolers, freezers or similar units to points of connection receiving waste from 4 or more fixtures.

1.6.2 Horizontal above grade waste pipes receiving condensate from air conditioning equipment to point of connection receiving waste from 4 or more fixtures.

1.7 Excavation and backfill required in conjunction with soil, waste and vent piping is specified in other Division-23 sections and is included as work of this section.

1.8 Refer to Division-7 section "Flashing and Sheet Metal" for flashings required in conjunction with soil and waste systems; not work of this section.

1.9 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data for:

Cleanouts
Floor drains

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types,

pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Above Ground Soil, Waste, and Vent Piping:

2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.

2.3.2 Underground Building Drain Piping (within 5 feet of the building):

2.3.2.1 Pipe Size 6" and Smaller: Polyvinyl chloride sewer pipe (PVC); Type DWV; PVC plastic type DWV socket-type.

2.4 Pipe Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

2.5 Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.

2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1 countersunk head.

2.6.2 Cleanout for PVC Systems:

2.6.2.1 Floor Cleanouts: Cast-iron body with adjustable head, brass plug, and scoriated nick-brass cover. Furnish with carpet flange for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.

2.6.2.2 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.

2.6.2.3 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug. Square 9”x9” wall access cover, with scoriated nickel bronze finish.

2.6.2.4 Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting tractor cover. Wade W-7035-Z or equal.

2.6.2.5 Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.

2.7 Floor Drains: Provide floor drains of size as indicated on drawings; and type, including features, as specified herein. Josam, Jay R. Smith, Wade, Zurn.

2.7.1 Floor Drains: Provide inside caulk bottom outlet or TY-Seal hub outlet with adaptor for cast iron trap installation and a 4" deep trap seal. Provide clamping rings for floors with membrane.

2.7.2 Floor Drains in Mechanical Rooms: Provide heavy duty floor drains with dura-coated cast iron body and top, bottom outlet, sediment bucket, and trap primer connection. Provide with membrane clamp and adjustable collar with slots.

2.7.3 Strainer: Provide 5" satin-nickel bronze strainer.

2.7.4 Trap Primer Connection: Provide ½" trap primer tapping.

2.7.5 Funnel: Provide funnel where shown on the drawings.

2.7.6 Basis of Design: Zurn Z-415B-P. Basis of design for floor drains in mechanical rooms is Zurn Z-541.

3 EXECUTION

3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 Piping Installation:

3.2.1 Install above grade soil and waste piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.

3.2.2 Install underground soil and waste pipes as indicated and in accordance with Florida Building Code-Plumbing. Lay underground piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is

completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

3.2.3 Install building soil and vent piping pitched to drain at minimum slope of ¼" per foot (2%) for piping smaller than 3", and 1/8" per foot (1%) for piping 3" and larger.

3.3 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Installation of Cleanouts: Install in above ground piping and building drain piping as indicated, as required by Florida Building Code-Plumbing; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.

3.5.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.

3.5.2 Install cleanouts to allow adequate clearance for rodding.

3.5.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.

3.5.4 Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.

3.5.5 Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.

3.6 Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

3.7 Vent Flashing Sleeves: Install on stack passing through roof, secure to stack flashing in accordance with manufacturer’s instructions. For metal roofs, sleeves and flashing are by Division-7.

3.8 Installation of Floor Drains: Install floor drains in accordance with manufacturer's written instructions and in locations indicated.

3.8.1 Coordinate flashing work with work of waterproofing and adjoining substrate work.

3.8.2 Install floor drains at low points of surface areas to be drained, or as indicated. Set tops

of drains flush with finished floor.

3.8.3 Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

3.8.4 Position drains so that they are accessible and easy to maintain.

3.9 Connection of Trap Primers: Connect trap primers as indicated, and in accordance with manufacturer's installation instructions. Pitch piping towards drain trap, minimum of 1/8" per foot (1%). Adjust trap primer for proper flow.

3.10 Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.11 Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION 221316

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SECTION 22 14 00
STORM WATER SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division 23 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of storm water systems work, is indicated on drawings and by requirements of this section.

1.4 Refer to appropriate Division-2 sections for exterior storm sewer system required in conjunction with storm water systems; not work of this section.

1.5 Insulation for storm water systems is specified in other Division 22 sections, and is included as work of this section. Insulation requirements include:

Body of roof drains.
Storm water piping above ceilings.

1.6 Excavation and backfill required in conjunction with storm water piping is specified in other Division 22 sections, and is included as work of this section.

1.7 Refer to Division-7 section "Flashing and Sheet metal" for flashings required in conjunction with storm water systems; not work of this section.

1.8 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials construction and installation of products. Comply with local utility requirements.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data for:

Cleanouts
Roof drains

1.10 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for backwater valves. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings

of materials which match pipe materials used in storm water systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division 22 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Above Ground Conductor Piping:

2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fittings, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.

2.3.2 Underground Building Drain Piping (within 5 feet of the building):

2.3.2.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fittings, solvent cement joints.

2.4 Piping Specialties: Provide piping specialties complying with Division 22 Basic Mechanical Materials and Methods section "Piping Specialties".

2.5 Supports and Anchors: Provide supports and anchors, complying with Division 22 Basic Mechanical Materials and Methods section "Supports, and Anchors".

2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.

2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

2.6.2 Cleanouts for PVC Systems:

2.6.2.1 Floor Cleanouts: Cast iron body with adjustable head, brass plug, and scoriated nickel-brass cover. Furnish with carpet marker carpet flange style for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.

2.6.2.2 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.

2.6.2.3 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug and round stainless steel access cover with screw. Wade W-8470-R-75.

2.6.2.4 Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting tractor cover. Wade W-7035-Z or equal.

2.6.2.5 Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.

2.7 Roof Drains: Provide roof drains of size as indicated on drawings; and type, including features, as specified herein. Josam, Jay R. Smith, Wade, Zurn. Basis of design: Zurn Z100F with cast iron body with combination membrane flashing clamp/gravel guard and low silhouette poly-dome. Provide flashing clamp/gravel guard to prevent debris from entering the drain while allowing water to immediately pass through at zero head. Provide 2” high overflow dam for overflow drains only. Drain shall be capable of providing GPM indicated on plumbing drawings.

3 EXECUTION

3.1 Examine substrate and conditions under which storm water system is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Piping Installation:

3.2.1 Install above grade storm water piping in accordance with Division 22 Basic Mechanical Materials and Methods section, "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.

3.2.2 Install underground storm water piping as indicated and in accordance with Florida Building Code-Plumbing. Lay underground storm water piping beginning at low point of systems, true to grade and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

3.2.3 Install building storm water piping pitched to drain at minimum slope of ¼" per foot (2%) or c" per foot (1%) as shown on the drawings.

3.3 Install piping specialties in accordance with requirements of Division 22 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors, in accordance with Division 22 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Install expansion joints on vertical risers as indicated, and as required by Florida Building Code-Plumbing.

3.6 Installation of Cleanouts: Install in conductor piping and storm drain piping as indicated, as required by Florida Building Code-Plumbing; at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each conductor. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.

3.6.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.

3.6.2 Install cleanouts to allow adequate clearance for rodding.

3.6.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.

3.6.4 Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.

3.6.5 Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.

3.6.6 Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through waterproof membrane.

3.7 Installation of Roof Drains: Install roof drains in accordance with manufacturer's written instructions and in locations indicated.

3.7.1 Coordinate flashing work with work of roofing, water-proofing and adjoining substrate work.

3.7.2 Coordinate with roofing as necessary to interface roof drains with roofing work.

3.7.3 Install roof drains at low points of surface areas to be drained, or as indicated.

3.7.4 Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

3.7.5 Position roof drains so that they are accessible and easy to maintain.

3.8 Test, clean, flush, and inspect storm water piping in accordance with requirements of Division 23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION 22 14 00

SECTION 22 16 00
GAS SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of fuel gas systems work, is indicated on drawings and schedules, and by requirements of this section.

1.5 Excavation and backfill required in conjunction with gas service piping is specified in Division-23 sections, and is included as work of this section.

1.6 Codes and Standards

1.6.1 NFPA Compliance: Fabricate and install gas systems in accordance with NFPA 54 "National Fuel Gas Code".

1.6.2 Utility Compliance: Fabricate and install gas systems in accordance with local gas utility company requirements and standards.

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions as follows:

Gas cocks and/or ball valves
Gas vents
Gas regulators
Access doors

1.8 O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for gas cocks, ball valves, gas vents, regulators. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with NFPA 54 where applicable. Base pressure rating on gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which

match pipe materials used in gas systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.2 Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification".

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Gas Service Piping: Refer to civil site utility plans.

2.3.2 Building Distribution Piping:

2.3.2.1 Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; malleable-iron threaded fittings.

2.3.2.2 Pipe Size 2½" and Larger: Black steel pipe; Schedule 40; wrought-steel buttwelding fittings.

2.4 Piping Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

2.5 Sealants: Provide UL-listed or AGA approved sealants for gas piping.

2.6 Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

2.7 Valves: Provide valves complying with Division-23 Basic Mechanical Materials and Methods section “Valves” and in accordance with the following listing.

2.7.1 Gas Cocks 2" and Smaller: UL-listed, AGA approved, 150 psi non-shock WOG, full port, bronze straightway cock, flat or square head, threaded ends.

2.7.2 Gas Cocks 2½" and Larger: UL-listed, CGA approved, MSS SP-78; 175 psi, lubricated plug type, full port, semi-steel body, single gland, wrench operated, flanged ends.

2.7.3 Wrenches: Provide operating wrenches for all gas cocks serving boilers.

2.7.4 Acceptable Manufacturers for gas cocks: Subject to compliance with requirements, provide products of one of the following: Resun R1430 and R1431, Milliken 200M and 201M or approved equal.

2.7.5 Master Gas Control Valve: Bronze or aluminum body, packless, single seat, suitable for fuel gas, solenoid operated, normally closed, UL-approved, manual reset, 24 volt DC. The valve shall close when de-energized by the FACP. Acceptable Manufacturer: Subject to compliance with requirements, provide products of one of the following: Automatic Switch Co., Bulletin 8044, or approved equal.

2.8 Kitchen Gas Appliance Connectors: Furnished with the kitchen equipment.

2.9 Gas Appliance Tube Connectors: Provide commercial grade appliance connectors

with a 2 year manufacturer's warranty. Tubing shall be Type 304 stainless steel tubing with type 304 stainless steel braiding to protect tubing from elongation. Tubing shall be complete with factory installed end connectors. Provide products that are AGA or CGA approved. Indicate maximum BTU input for each length and size used on submittal.

2.10 Gas Vents: Provide stainless steel special gas vent system for gas-fired appliances, except where noted otherwise on the drawings. The system shall include pipe, top, flashing cone, storm collar, joist shield, support plates, firestops, and fittings as required by the manufacturer for a complete installation. Acceptable Manufacturer: Subject to compliance with requirements, provide products of one of the following: Metalbestos, Hart and Cooley or approved equal.

2.11 Gas Meter and Regulator: Provided by local utility company.

2.12 Access Doors: Provide access doors to service all valves and other devices as required in accordance with Division-23 Basic Materials and Methods Section "Access Doors".

3 EXECUTION

3.1 Examine areas and conditions under which gas systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer. Coordinate with gas supplier prior to starting work.

3.2 Install mechanical identification in accordance with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification".

3.3 Install gas piping in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.3.1 Use sealants on metal gas piping threads which are chemically resistant to gas. Use sealants sparingly, and apply to only male threads of metal joints.

3.3.2 Remove cutting and threading burrs before assembling piping.

3.3.3 Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped or damaged. Do not use bushings in the gas system.

3.3.4 Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping, or equipment connections are completed.

3.3.5 Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

3.3.6 Install drip-legs in gas piping where indicated, and where required by code or gas company requirements.

3.3.7 Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.

3.3.8 Use dielectric unions where dissimilar metals are joined together.

3.3.9 Install piping with 1/64" per foot (1/8%) downward slope in direction of flow.

3.4 Gas Service: Arrange with utility company to provide gas service to indicated location with meter, pressure regulator and shutoff at terminus. Consult with utility as to extent of its work, costs, fees, and permits involved. The Contractor shall pay such costs and fees and obtain permits.

3.5 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.6 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.7 Installation of Valves:

3.7.1 Gas Cocks: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.

3.7.2 Locate gas cocks where easily accessible, and where they will be protected from possible injury.

3.8 Equipment Connections: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.9 Appliance Connectors: Install tubing, valves, connectors, fittings in accordance with their listing and as furnished with the kitchen equipment. Hose, fittings and valves shall not restrict gas flow and shall be rated for the capacity of the appliance they serve. Hoses shall not be crimped. Hoses behind movable appliances shall not be crimped when appliance is extended from wall or when appliance is set in working position. Appliance restraining device shall set to engage just prior to the connector being fully extended. Check all tubing, piping, fittings & valves for leakage at less than 50 part per million.

3.10 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-23 Basic Mechanical Materials and Methods section “Access Doors”.

3.11 Gas Vent Installation:

3.11.1 Install gas vents for all draft gas-fired appliances in accordance with NFPA 54 and the manufacturer's instructions. Provide all flashing and related materials.

3.11.2 Gas vents shall terminate at least 3 feet above the roof and 2 feet higher than any portion of a building within a horizontal distance of 10 feet.

3.11.3 Minimum vertical gas vent length is 5 feet.

3.11.4 Slope horizontal gas vent connectors upward at least ¼ inch per foot.

3.12 Piping Tests: Inspect, test, and purge gas systems in accordance with NFPA 54, local utility requirements, and Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems". DO NOT INTRODUCT AIR INTO THE SYSTEM, VENT OR PURGE WITH NITROGEN. DISCHARGE VENT OR PURGE GASES TO THE EXTERIOR OF THE BUILDING.

END OF SECTION 221600

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SECTION 22 30 00
PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.

1.3 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.4 Extent of plumbing fixtures work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.5 Refer to Division-26 sections for field-installed electrical wiring required for plumbing fixtures; not work of this section.

1.6 Codes and Standards:

1.6.1 Plumbing Fixture Standards: Comply with applicable portions of Florida Building Code-Plumbing pertaining to materials and installation of plumbing fixtures.

1.6.2 ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.

1.6.3 PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.

1.6.4 UL Listing: Construct plumbing fixtures requiring electrical power in accordance with UL standards and provide UL-listing and label.

1.6.5 ARI Compliance: Construct and install water coolers in accordance with ARI Standard 1010 "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers", and provide Certification Symbol.

1.6.6 ANSI Compliance: Construct and install barrier-free plumbing fixtures in accordance with ANSI Standard A117.1 "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, furnished specialties and accessories; and installation instructions. Submit manufacturer's assembly-type drawings indicating dimensions, roughing-in requirements, required clearances, and methods of assembly of components and anchorages. The submittal shall be organized by “fixture number” and each fixture package shall be so identified. Each fixture package

shall include all of the required fitting and trim, even if such devices are used for more than one fixture.

1.8 O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.

1.9 Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

2 PRODUCTS

2.1 General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide trim, carrier, seats, and valves as specified. Where not specified, provide products as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 Model Numbers: Basis of design model numbers of a particular manufacturer are listed in the fixture schedule as an aid to contractors. Where conflicts between the model number and the written description occur, the written description shall govern. Where acceptable manufacturers are listed, products are subject to compliance with requirements.

2.3 Refer to plumbing construction documents for fixture specifications.

2.4 Materials:

2.4.1 Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.

2.4.2 All fixtures shall be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.

2.4.3 Where fittings, trim and accessories are exposed or semi-exposed provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

2.4.4 Stainless Steel Sheets: ASTM A 167, Type 302/304, hardest workable temper. Finish shall be No. 4, bright, directional polish on exposed surfaces.

2.4.5 Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C 554.

2.4.6 Synthetic Stone: High quality, free from defects, glaze on exposed surfaces, stain

resistant.

2.5 Plumbing Fittings, Trim and Accessories:

2.5.1 Faucets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality chrome-plated, cast-brass faucets, valves, or other dispensing devices, of type and size indicated, and as required to operate as indicated.

2.5.1.1 Aerators: Provide aerators of types approved by Health Department having jurisdiction.

2.5.1.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Chicago Faucet Co., Kohler Co., Speakman Co., T & S Brass and Bronze Works, Water Saver Faucet Co., Zurn.

2.5.2 Stops: Provide chrome-plated brass, angle type, manual shutoff valves and 3/8" chrome-plated flexible supply pipes to permit fixture servicing without shutdown of water supply piping systems for all fixtures. Coordinate with fixture requirements.

2.5.2.1 Provide loose key stops.

2.5.2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn or approved equal.

2.5.3 Waste Outlets: Provide removable P-traps, drains, waste arms, tailpieces and wastes-to-wall where drains are indicated for direct connection to drainage system for all fixtures unless otherwise noted. Provide drains, tailpieces and waste arms where indirect drains are indicated. Waste outlets shall be full size of fixture drain connection.

2.5.3.1 Provide chrome-plated cast-brass P-traps and drains with cleanout.

2.5.3.2 P-traps, wastes and drains of all types shall be 17-gauge.

2.5.3.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn, or approved equal.

2.5.4 Flush Valves: Provide quiet-flush, chrome-plated, cast-brass flush valves with vacuum breaker and screwdriver stop. Where handicap service is indicated, provide ADA compliant handles with the handle on the approach side of the stall.

2.5.4.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Sloan Valve Co. or Zurn.

2.5.5 Carriers: Provide cast-iron supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron or steel as indicated. Coordinate with specific fixture requirements and conditions of the project.

2.5.5.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Josam, Wade, Zurn, J.R. Smith.

2.5.6 Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

2.5.7 Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome-plated brass escutcheons with friction clips.

2.5.8 Comply with additional fixture requirements listed for each fixture and as required for a complete and functional system.

2.6 Water Closets:

2.6.1 General: Provide white china siphon jet type unless otherwise noted.

2.6.1.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.6.2 Fixture Seats: Provide white, heavy molded plastic fixture seats with stainless steel self-sustaining check hinges.

2.6.2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Bemis Mfg. Co., Beneke Corp., Church or Comfort Seats.

2.7 Urinals:

2.7.1 General: Provide white china siphon jet wall hung type with ¾" top spud and 2" outlet unless otherwise noted. Provide short foot carrier with top and bottom hanger plates.

2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.8 Lavatories:

2.8.1 General: Provide white china lavatories.

2.8.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.9 Electric Water Coolers:

2.9.1 General: Provide self-contained electric water cooler with entire water system free of lead. All joints shall be made using silver solder. Units shall be complete with an air-cooled refrigeration system consisting of a hermetic compressor, cooler, pre-cooler, condenser fan, thermostat safety controls and all other related devices. The unit shall have a capacity of 8 gallons per hour. The cabinet shall be stainless steel with vermin proof insulation. The top shall be fabricated of stainless steel with a No. 4 finish. Where

handicap units are indicated, the bubbler and fountain shall be ADA compliant.

2.9.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay Mfg. Co., Halsey Taylor Div., Haws Drinking Faucet Co., Sunroc, Oasis.

2.10 Mop Receptors:

2.10.1 General: Provide one piece mop receptors with 3" integral stainless steel grid drain. Provide wall-mounted faucet with arm handles, vacuum breaker, stops, hose connection and hose bracket. Provide 30" hose.

2.10.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Stern-Williams Co., or Acorn.

2.11 Service Sinks:

2.11.1 General: Provide acid resistant service sinks with back and wall hanger. Provide double faucet with bucket hook, vacuum breaker, stops and hose end. Provide 3" trap to wall, enameled inside, painted outside with foot support. Provide stainless steel rim guard. Paint outside of sink and trap black.

2.11.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane co., Eljer co., Fiat Products, Kohler Co., Stern-Williams Co.

2.12 Stainless Steel Sinks:

2.12.1 General: Provide Type 304, 18 gauge self-rimming stainless steel back ledge with No. 4 finish . Provide sound deadening material on the sides and bottom of the sink. Provide grid drain or strainer with removable crumb cup and stopper as indicated.

2.12.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay, Just

2.13 Showers:

2.13.1 General:

2.13.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Leonard Valve Co., MCC Powers Process Controls, Symmons, Speakman Co., Zurn

2.14 Water Heaters:

2.14.1 Accessories: VB, relief, pan, stand, etc.

2.14.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Ruud, Rheem, Mor-Flo, State, A.O.

Smith.

2.15 Emergency Showers and Eyewashes:

2.15.1 General:

2.15.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Bradley Corp., Western, Water Saver Faucet Co.

3 EXECUTION

3.1 Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Install plumbing fixtures of types indicated where shown and at indicated heights. Install in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Install in accordance with ADA and applicable handicap code requirements. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of Florida Building Code-Plumbing pertaining to installation of plumbing fixtures. Furnish templates for cut-outs in countertops. Coordinate exact fixture locations with countertop shop drawings.

3.3 Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement. Mount at heights shown on the drawings. Fixture heights are floor-to-rim distance. Fitting heights are to centerline.

3.4 Install stop valve in water supply to each fixture.

3.5 After fixtures are set, the crack between the fixture and wall shall be caulked with DAP silicone-based caulking, or approved product specified by the architect.

3.6 Protect installed fixtures from damage during remainder of construction period.

3.7 Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.8 Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

3.9 Clean plumbing fixtures, trim, aerators, and strainers of dirt and debris upon completion of installation.

3.10 Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.

3.11 Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION 223000

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SECTION 23 01 00
MECHANICAL GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Mechanical Requirements Section. Provisions of this section apply to work of all Division 23 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 This project will be commissioned. Refer to 23 08 00 Mechanical Systems Commissioning for additional requirements applying to work of this section.

1.2.5 Definitions:

1.2.5.1 Provide: Furnish and install, complete and ready for intended use.

1.2.5.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.5.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.

1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.

1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.

1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.

1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.

1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Final Completion, or from Owner's occupancy, whichever is earlier.

Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.

1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.

1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.

1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.

1.9.1.1.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet

in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than ¼" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final “Approved” or “Approved as Noted” copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to

fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.

2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.

2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

3.2.7 Start of work will be construed as acceptance of suitability of work of others.

3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 23. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.10 Climate Control: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.

3.11 Record Drawings:

3.11.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.12 Acceptance:

3.12.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

3.12.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

3.12.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:

Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.

3.12.4 Record Drawings: Submit record drawings.

3.12.5 Test and Balance Report: Submit four certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection unless otherwise required by Division 1.

3.12.6 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

3.12.7 Control Diagrams: Control diagrams, sequences, and panel wiring diagrams shall be laminated and attached to/contained within the DDC enclosure for each system

END OF SECTION 230100

SECTION 23 05 13
ELECTRIC MOTORS

1 GENERAL

1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Section apply to work of this Section.

1.2 This section is a Division 23 Basic Mechanical Materials and Methods section, and is part of each Division 23 section making reference to motors specified herein.

1.3 Extent of motors required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Comply with the requirements of Division 26.

1.5 UL Compliance: Comply with applicable UL standards pertaining to motors.

1.6 Approval Submittals:

1.6.1 Product Data: When required by other Division-23 sections, submit manufacturers standard product data sheets for each type of motor provided. Submit with Division-23 section using the motors, not as a separate submittal. Mark data sheet with arrows indicating product being supplied and list by unique descriptive name all motors to which each data sheet applies. Clearly indicate type, service factor, rpm, duty cycle, voltage, phase, nominal full load efficiency, power factor and insulation class. Field verify and coordinate mounting and frame requirements for matching the drive.

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit operation and maintenance data for each type of motor. Include these data in O&M Manual. Submit two copies of nameplate data sheet for each motor. One copy shall be included with the O&M Manual and a second copy shall be inserted in a waterproof pouch or bag and attached to the motor. Nameplate data sheets shall be typed or neatly printed and shall include all data on the motor nameplate plus a unique motor description such as "AHU-3 Fan Motor", "Distribution Pump #1" or similar description.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, General Electric, Baldor, US Electric, or approved equal.

2.2 General:

2.2.1 Motors shall conform to applicable portions of NEMA Standard MG-1, Motors and Generators.

2.2.2 Motors shall be sized for the application such that when the driven equipment is operated at rated capacity the motor current will not exceed the full-load nameplate current. Service factor shall not be used in normal operation.

2.3 Motor Design:

2.3.1 Integral Horsepower Motors:

2.3.1.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.

2.3.1.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200 volts for 208 volt systems, 230 volts for 240 volt systems and 460 volts for 480 volt systems.

2.3.1.3 Motors shall be NEMA Design B and shall have 1.15 service factor or greater at 60 hertz.

2.3.1.4 Insulation Systems

2.3.1.4.1 In fixed speed applications, motors shall have Class B insulation with 80ºC rise over 40ºC ambient.

2.3.1.4.2 For variable frequency drive (VFD) applications, motors shall have Class F insulation with 105ºC rise over 40ºC ambient. Motor manufacturer shall identify motors being used for VFD applications by marking the motor with a stainless steel name-plate “Inverter Ready”.

2.3.1.5 Motor efficiencies shall be based on IEEE-112, 1984, Test Method B, as specified in NEMA Standard MG1-12.53. NEMA motor efficiency and power factor shall be clearly shown on the motor nameplate. Inverter duty motors shall have a CIV rating based on NEMA.

2.3.1.6 Motors shall be premium efficiency type and shall meet or exceed the following minimum nominal efficiencies at rated voltage.

230/460 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	82.0 pct
20 to 25 hp	92.0 pct.	82.0 pct
30 hp	92.4 pct.	82.0 pct
40 to 50 hp	93.0 pct.	85.0 pct
60 hp	93.6 pct.	85.0 pct
75 hp	94.1 pct.	85.0 pct
100 to 125 hp	94.5 pct.	85.0 pct
150 to 200 hp	95.0 pct.	85.0 pct
over 200 hp	95.4 pct.	87.0 pct

200 VOLT, 3 PHASE

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 to 2 hp	84.0 pct.	75.0 pct
3 to 5 hp	87.5 pct.	77.0 pct
7.5 hp	89.5 pct.	80.0 pct
10 hp	90.2 pct.	80.0 pct
15 hp	91.0 pct.	80.0 pct
20 to 25 hp	92.0 pct.	80.0 pct

2.3.1.7 Motors 25 hp and larger which are to be installed outdoors or in other high humidity areas shall be equipped with silicone rubber space heaters. Space heaters shall be energized when motor is de-energized.

2.3.2 Fractional Horsepower Motors one-half hp and above:

2.3.2.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.

2.3.2.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200, 230 or 460 volts as shown on the drawings.

2.3.2.3 Motors shall be NEMA Design B with class B insulation, unless used with variable frequency drives.

2.3.3 Fractional Horsepower Motors less than one-half hp:

2.3.3.1 Motors shall be single phase, 60 hertz, rated at 120 volts with integral thermal protection.

2.4 Overload Protection: Properly sized overload protection shall be provided for each motor. This protection may be an integral part of the motor or may be part of the motor controller and shall interrupt each ungrounded conductor.

3 EXECUTION

3.1 Motor Size and Location:

3.1.1 Size and location of motors shown on the drawings are based on a particular design and may change with a different manufacturer. Submittal of shop drawings or product literature indicating motor sizes or locations different from that designed indicates that Contractor has fully coordinated any required changes to the electrical system with other trades. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.1.2 Contractor shall verify and make any necessary adjustments to electrical service, branch circuit wiring, branch circuit protection, overload protection, disconnect and controller (starter), or VFD based on actual nameplate data of the motors supplied prior to installation. Where applicable, connect motor winding thermostat to VFD.

3.2 Motor Voltages: Contractor shall field verify system voltage prior to ordering or installing any motors. Submittal of shop drawings or product literature indicating motor voltages indicates that Contractor has fully coordinated the motor with the electrical system and that any discrepancies have been resolved. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.3 Motor Mounting: Adjust motor mounting as required to adjust the drive train for proper belt operation and to accommodate sheave changes or other requirements of the test and balance work.

END OF SECTION 230513

SECTION 23 05 19
METERS AND GAUGES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring meters and gauges specified herein.

1.3 Extent of meters and gauges required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.

1.5 ANSI and ISA Compliance: Comply with applicable portions of ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.6 Approval Submittals:

1.6.1 Product Data: When required by other Division-23 sections, submit manufacturer's technical product data for each type of meter and gauge. Submit with Division-23 section using meters and gauges, not as a separate submittal. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit for:

Thermometers
Pressure gauges
Gauge connector plugs
Venturi flow meters
Automatic balancing valves

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit calibration curves and operating instructions for each type of meter or gauge. Include this data in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers (Thermometers and Pressure Gauges): Subject to compliance with requirements, Ashcroft, Ernst Gauge Company, Weksler, Marshalltown Instruments, Trerice, Weiss Instruments, Wheatley, Fluidyne or approved equal.

2.2 Glass Thermometers:

2.2.1 General: Provide glass thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.2.2 Case: Die cast aluminum finished in baked epoxy enamel, glass front, spring secured,

9" long.

2.2.3 Adjustable Joint: Die cast aluminum, finished to match case, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.

2.2.4 Tube and Capillary: Liquid filled, magnifying lens, 1% scale range accuracy, shock mounted.

2.2.5 Scale: Satin faced, non-reflective aluminum, permanently etched markings.

2.2.6 Stem: Copper-plated steel or brass for separable socket, length to suit installation.

2.2.7 Range: Conform to the following:

2.2.7.1 Hot Water: 30° - 240°F with 2°F scale divisions.

2.2.7.2 Chilled Water: 30° - 180°F with 2°F scale divisions.

2.3 Thermometer Wells: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well if wells do not have a permanent instrument installed. Same manufacturer as thermometers.

2.4 Pressure Gauges:

2.4.1 General: Provide pressure gauges of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.4.2 Type: General use, 1% accuracy, ANSI B40.1 grade A, phosphor bronze bourdon type, bottom connection.

2.4.3 Case: Drawn steel or brass, glass lens, 4-½" diameter.

2.4.4 Connector: Brass with ¼" male NPT.

2.4.5 Scale: White coated aluminum with black scale.

2.4.6 Range: Select so that highest possible pressure does not exceed 75% of full scale.

2.5 Pressure Gauge Cocks:

2.5.1 General: Provide ¼" ball valves for use as pressure gauge cocks.

2.5.2 Snubber: ¼" brass bushing with corrosion resistance porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.

2.6 Gauge Connector Plugs:

2.6.1 Provide temperature gauge connector plugs pressure rated for 500 psi and 200ºF. Construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing

valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.6.2 Provide pressure gauge connector plugs pressure rated for 500 psi and 200ºF. construct of brass and finish in nickel-plate, equip with 1/2" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/2" O.D. probe assembly from dial type insertion pressure gauge. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.6.3 Provide master test kit with hard plastic case including one 2-1/2" test gauge of suitable range, one gauge adapter probe, and one stem pocket testing thermometer (0ºF-220ºF).

2.7 Shutoff and Manual Throttling Venturi Valves

2.7.1 Pipe 2” and Smaller: Provide as indicated, threaded brass manual throttling venturi valve with large diameter plated ball and PTFE seats. Provide blowout proof stem with EPDM O-ring and PTFE packing with packing nut. Provide 2” extended stem and measurement ports with caps.

2.7.2 Pipe Larger than 2”: Provide as indicated, flanged steel manual throttling venturi valve with full lug type butterfly valve body with EDPM seat and gasket, stainless steel stem and disc, and nylon bearings. Provide 2” extended stem and measurement ports with caps.

2.7.3 Acceptable Manufacturers: Flow Design, Griswold, Bell & Gossett, NuTech.

2.8 Automatic Balancing Valves:

2.8.1 General: Provide as indicated, threaded automatic balancing valves equipped with optional valve kits to measure the flow rate. Valves shall utilize a stainless steel flow mechanism that is factory-set with ±5% accuracy. The flow mechanism shall be removable with standard tools to change the flow rate setting. Provide dual hose meter kit. Provide threaded mini’s for terminal unit coils. Provide metal nameplate to indicate flow rate. Provide valves with pre-formed polyurethane insulation suitable for use on heating and cooling systems.

2.8.2 Acceptable Manufacturers: Griswold, Bell & Gossett, , Flow Design Inc., NuTech

3 EXECUTION

3.1 Installation of Temperature Gauges:

3.1.1 General: Install temperature gauges in vertical upright position, and tilt so as to be easily read by observer standing on floor.

3.1.2 Locations: Install in the following locations, and elsewhere as indicated:

3.1.2.1 At inlet and outlet of each hydronic coil in air handling units.

3.1.2.2 At inlet and outlet of each hydronic boiler and chiller.

3.1.3 Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Thermometers shall have at least 75% of stem in moving fluid.

3.1.4 Temperature Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.2 Installation of Pressure Gauges:

3.2.1 General: Install pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.

3.2.2 Locations: Install in the following locations, and elsewhere as indicated:

3.2.2.1 At suction and discharge of each pump.

3.2.2.2 At discharge of each water pressure reducing valve.

3.2.2.3 At inlet and outlet of water cooled condensers and refrigerant cooled chillers.

3.2.3 Pressure Gauge Cocks: Install in piping tee with snubber.

3.2.4 Pressure Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.3 Automatic Balancing Valves: Install on piping in accordance with the manufacturer’s printed instructions. Verify proper operation over full range of control valve and pump operation.

3.4 Adjusting and Cleaning:

3.4.1 Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

3.4.2 Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows; repair any scratched or marred surfaces with manufacturer's touch-up paint.

END OF SECTION 230519

SECTION 23 05 20
PIPES AND PIPE FITTINGS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22 and 23 section making reference to pipes and pipe fittings specified herein.

1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-21, 22 or 23 sections.

1.4 Codes and Standards:

1.4.1 Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.

1.4.2 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.

1.5 Test Report and Verification Submittals:

Submit welding certification for all welding installers.
Submit brazing certification for all brazing installers.

2 PRODUCTS

2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.3 Piping Materials/Products:

2.3.1 Soldering Materials:

2.3.1.1 Tin-Antimony (95-5) Solder: ASTM B-32, Grade 95TA.

2.3.1.2 Silver-Phosphorus Solder: ASTM B-32, Grade 96TS.

2.3.2 Pipe Thread Tape: Teflon tape.

2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.

2.3.4 Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast iron flanges; raised-face for steel flanges, unless otherwise noted.

2.3.5 Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials. Materials shall be determined by installer to comply with installation requirements.

2.3.6 Brazing Materials: Silver content of not less than 15%. Materials shall be determined by installer to comply with installation requirements.

2.4 Copper Tube and Fittings:

2.4.1 Copper Tube:

2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.

2.4.1.2 ACR Copper Tube: ASTM B280.

2.4.2 Fittings:

2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.

2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4.2.3 Cast-Copper Flared Tube Fittings: ANSI B16.26.

2.5 Steel Pipes and Pipe Fittings

2.5.1 Pipes:

2.5.1.1 Black Steel Pipe: ASTM A-53 or A-120.

2.5.1.2 Galvanized Steel Pipe: ASTM A-53 or A-120.

2.5.2 Pipe Fittings:

2.5.2.1 Threaded Cast Iron: ANSI B16.4.

2.5.2.2 Threaded Malleable Iron: ANSI B16.3; plain or galvanized as indicated.

2.5.2.3 Malleable Iron Threaded Unions: ANSI B16.39; selected by installer for proper piping fabrication and service requirements including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.

2.5.2.4 Threaded Pipe Plugs: ANSI B16.14.

2.5.2.5 Flanged Cast Iron: ANSI B16.1, including bolting.

2.5.2.6 Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing.

2.5.2.7 Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns, rated to match connected pipe.

2.5.2.8 Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than schedule 80 pipe where length remaining unthreaded is less than 1 ½ inches, and where pipe size is less than 1 ½ inches, and do not thread nipples full length (no close-nipples).

2.6 Plastic Pipes and Fittings:

2.6.1 Pipes:

2.6.1.1 PVC DWV Pipe: ASTM D-2665, Schedule 40.

2.6.2 Fittings:

2.6.2.1 PVC Solvent Cement: ASTM D-2564.

2.6.2.2 PVC DWV Socket: ASTM D-2665.

3 EXECUTION

3.1 Installation

3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leak proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.

3.1.2 Comply with ANSI B31 Code for Pressure Piping.

3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to ½" where furring is

shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.

3.1.4 Concealed Piping: Unless specifically noted as “Exposed” on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.

3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.

3.2 Piping System Joints: Provide joints of the type indicated in each piping system.

3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

3.2.2 Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.

3.2.3 Flanged Joints: Match flanges within piping system, and at connection with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets. Bolts shall project 1/8" to 3/8" beyond nut face when tight.

3.2.4 Weld pipe joints in accordance with recognized industry practice and as follows. Be guided by ANSI B.31.

3.2.4.1 Weld pipe joints only when ambient temperature is above 0°F.

3.2.4.2 Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.

3.2.4.3 Use pipe clamps or tack-weld joints; 4 welds for pipe sizes to 10". All welds shall be open-butt.

3.2.4.4 Build up welds with root pass, followed by filler pass and then a cover pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.

3.2.4.5 Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.

3.2.4.6 At Installer's option, install forged branch-connection fittings wherever branch pipe is less than 3" and at least two pipe sizes smaller than main pipe indicated; or install regular "T" fitting. Weld-O-Let or equal.

3.2.5 Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.

3.2.5.1 Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.

3.2.5.2 PVC sewer pipe bell/gasket joints shall be installed in accordance with ASTM D-2321.

3.2.6 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.

3.3 Piping Installation

3.3.1 Install piping to allow for expansion and contraction.

3.3.2 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with a continuous plastic sleeve. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.

3.3.3 Underground Piping:

3.3.3.1 Provide plastic tape markers over all underground piping. Provide copper wire over all underground plastic piping outside the building. Locate markers 18" above piping.

3.3.3.2 Provide an 8 mil polyvinyl sleeve for the following types of pipe buried underground: black steel pipe, galvanized steel pipe, copper tubing.

END OF SECTION 230520

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SECTION 23 05 21
PIPING SPECIALTIES

1 GENERAL

1.1 Drawings and general provisions of contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring piping specialties specified herein.

2 PRODUCTS

2.1 General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer 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.

2.2 Escutcheons:

2.2.1 General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

2.2.2 Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

2.2.3 Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

2.3 Dielectric Unions: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action and stop corrosion. .

2.4 Fire Barrier Penetration Seals:

2.4.1 Provide seals for any opening through fire-rated walls, floors, or ceilings used as passage for mechanical components such as piping or ductwork in accordance with the requirements of Division 7.

2.5 Fabricated Piping Specialties:

2.5.1 Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over ¼" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

2.5.2 Pipe Sleeves: Provide pipe sleeves of one of the following:

2.5.2.1 Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6" 16 gage; over 6", 14 gage.

2.5.2.2 Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

2.5.2.3 Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

2.5.3 Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:

2.5.3.1 Caulking and Sealant: Provide foam or caulking and sealant compatible with piping materials used.

2.6 Low Pressure Y-Type Pipeline Strainers:

2.6.1 General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Provide Type 304 stainless steel screens.

2.6.1.1 Water Strainers: Select for 200 psi working pressure (water, oil or gas). Provide 20 mesh screens through 2" size and 1/16" perforations for 2½" size and larger.

2.6.2 Select from the following types:

2.6.2.1 Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.

2.6.2.2 Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

2.6.2.3 Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.

3 EXECUTION

3.1 Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

3.2 Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

3.3 Fire Barrier Penetration Seals: Provide pipe sleeve as required. Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions. Refer to Division 7.

3.4 Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

3.5 Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves ¼" above level floor finish, and ¾" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

3.5.1 Install sleeves in fire-rated assemblies in accordance with the listing of the assembly and the fire barrier sealant.

3.5.2 Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings. Fill annular space with caulking or fire barrier sealant as required.

3.5.3 Install steel-pipe sleeves at floor penetrations. Fill annular space with caulking or fire barrier sealant as required.

3.5.4 Install iron-pipe sleeves at all foundation wall penetrations and at exterior penetrations; both above and below grade. Fill annular space with caulking or mechanical sleeve seals.

3.6 Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers ¾" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.

3.7 Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:

Pumps
Temperature control valves.
Pressure reducing valves.
Temperature or pressure regulating valves.

END OF SECTION 230521

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SECTION 23 05 23
VALVES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

1.2 This section is a Division-23 Basic Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring valves specified herein.

1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-21, 22, and 23 sections.

1.4 Quality Assurance:

1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.

1.4.2 Valve Types: Provide valves of same type by same manufacturer.

1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing.

1.4.4 Valves Installed in Boiler Rooms: Comply with ASME Boiler and Pressure Vessel Code.

1.5 Approval Submittals: Submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-21, 22, or 23 section using the valves, not as a separate submittal. For each valve, identify systems where the valve is intended for use.

Gate Valves. Type GA.
Check Valves. Type CK.
Ball Valves. Type BA.
Butterfly Valves. Type BF.

1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

2.3 Gate Valves:

2.3.1 Packing: Select valves designed for repacking under pressure when fully opened, equipped with non-asbestos packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

2.3.2 Comply with the following standards:

Cast Iron Valves: MSS SP-70. Cast Iron Gate Valves, Flanged and Threaded Ends.
Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.3.3 Types of gate (GA) valves:

1 Threaded Ends 2" and Smaller (GA1): Class 125, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-100. Nibco T-111. Crane 428. Milwaukee 148.

2 Soldered Ends 2" and Smaller (GA2): Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge. Stockham B-108 or B-109. Nibco S-111. Crane 1334. Milwaukee 149.

3 Flanged Ends 2½" and Larger (GA3): Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham G-623. Nibco F617-0. Crane 465½. Milwaukee F2885.

4 Threaded Ends 2" and Smaller (GA4): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-122. Nibco T-131. Crane 431. Milwaukee 1150.

5 Soldered Ends 2" and Smaller (GA5): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-124. Nibco S-134. Milwaukee 1169.

6 Threaded Ends 2" and Smaller (GA6): 175 WWP, bronze body, screwed bonnet, rising stem, OS&Y, solid wedge, UL-listed. Stockham B-133. Nibco T-104-0.

7 Flanged Ends 2½" and Larger (GA7): 175 WWP, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL listed. Stockham G-634. Nibco F-607-0TS

8 Threaded Ends 2" and Smaller (GA8): Class 200, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-132. Nibco T-154-SS. Milwaukee 1174.

9 Flanged Ends 2½" and Larger (GA9): Class 250, iron body bronze mounted,

bolted bonnet, rising stem, OS&Y, solid wedge. Stockham F-667. Nibco F-667-0. Crane 7½E. Milwaukee F-2894.

10 Threaded Ends 2" and Smaller (GA10): Class 300, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-145. Nibco T-174-SS. Crane 634E. Milwaukee 1184.

11 Flanged Ends 2½" and Larger (GA11): Class 300, cast steel body, bolted bonnet, rising stem, solid wedge, seal-welded seat rings. Provide trim to match use. Stockham 30-0F. Crane 33.

12 Flanged Ends 2½" and Larger (GA12): 300 WWP, iron body, bolted bonnet, bronze mounted, rising stem, OS&Y, solid wedge, UL-listed. Stockham F-670. Nibco F-697-0.

2.4 Check Valves:

2.4.1 Construction: Construct valves of castings free of any impregnating materials. Construct valves with a bronze regrinding disc with a seating angle of 40º to 45º, unless a composition disc is specified. Provide stop plug as renewable stop for disc hanger, unless otherwise specified. Disc and hanger shall be separate parts with disc free to rotate. Support hanger pins on both ends by removable side plugs.

2.4.2 Comply with the following standards:

Cast Iron Valves: MSS SP-71. Cast Iron Swing Check Valves, Flanged and Threaded Ends.

Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.4.3 Types of check (CK) valves:

1 Threaded Ends 2" and Smaller (CK1): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-319. Nibco T-413-BY. Crane 1707. Milwaukee 509.

2 Soldered Ends 2" and Smaller (CK2): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-309. Nibco S-413-B. Crane 1707S. Milwaukee 1509.

3 Flanged Ends 2½" and Larger (CK3): Class 125, iron body, bronze-mounted, bolted cap, horizontal swing, cast-iron or composition disc. Stockham G-931 or G-932 as applicable. Nibco F918-B. Crane 373. Milwaukee F2974 as applicable.

4 Threaded Ends 2" and Smaller (CK4): 200 WWP, bronze body, screwed cap, horizontal swing, regrinding type bronze disc, for fire sprinkler use. Nibco KT-403-W.

5 Flanged Ends 2½" and Larger (CK5): 175 WWP, iron body, bolted cap, bronze mounted, composition disc, UL listed, with ball drip if required. Stockham G-940.

Nibco F-908-W.

6 Threaded Ends 2" and Smaller (CK6): Class 200, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-345. Nibco T-453-B. Crane 36. Milwaukee 518/508.

7 Flanged Ends 2½" and Larger (CK7): Class 250, iron body, bronze mounted, bolted cap, cast-iron disc. Stockham F-947. Nibco F-968-B. Crane 39E. Milwaukee F2970.

8 Threaded Ends 2" and Smaller (CK8): Class 300, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-375. Nibco T-473-B. Crane 76E. Milwaukee 517/507.

9 Flanged Ends 2½" and Larger (CK9): Class 300, cast steel body, bolted cap, horizontal swing, seal welded seat rings, chromium stainless disc. Stockham 30-SF. Crane 159.

10 Pump Discharge (CK10): Silent, Spring check valve, class 125 minimum, integral cast flanges, 302SS springs, ductile iron or cast iron globe body, bronze disc. Mueller 105MAP, StayFlow SIL-DG1, Titan CV 50-DI.

2.5 Ball Valves:

2.5.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.5.2 Construction: Ball valves shall be rated for 150 psi saturated steam and 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.5.3 Comply with the following standards:

MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.
MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.5.4 Types of ball (BA) valves:

1 Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco T-585-66. Stockham T285-BR-R-T. Milwaukee BA100S. Apollo 77-100.

2 Soldered Ends 2" and Smaller (BA2): Bronze three-piece full port body with adjustable stem packing. Nibco S-595-Y-66. Milwaukee BA350. Apollo 82-200.

3 Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas. Nibco T-585-70-UL.

4 Threaded Ends 2" and Smaller (BA4): 175 WWP, bronze two-piece body, UL listed for fire protection service. Nibco KT-585-70-UL and KT-580-70-UL.

5 Threaded Ends 2" and Smaller (BA5): 400 WWP, bronze two-piece body, for fire protection service. Nibco KT-580.

6 Threaded Ends 2½" and Smaller (BA6): 300 WWP, bronze three-piece body, gear operator with handwheel, indicator flag, accepts tamper switch, for fire protection, UL listed. Nibco T-505-4 and G-505-4.

7 Flanged Ends 2½" and Larger (BA7): Class 150, carbon steel full bore two-piece body with adjustable stem packing, stainless steel ball, trim, and handle. Nibco F515-S6 series. Apollo 88A-240.

2.6 Butterfly Valves:

2.6.1 General: Comply with MSS SP-67, Butterfly Valves. Provide butterfly valves designed for tight shut-off. Where used for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on all butterfly valves 6" and larger.

2.6.2 Types of butterfly (BF) valves:

1 Wafer Type 3" and Larger (BF1): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-512. Nibco WD 2110-3. Crane 42-FXB-TL. Milwaukee MW222E-8416.

2 Lug Type 3" and Larger (BF2): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-712. Nibco LD 2110-3. Crane 44-FXB-TL. Milwaukee ML132B-8416.

3 Wafer Type 3" and Larger (BF3): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-522 and LG-521. Nibco WD 2110-5. Crane 42-FXB-G. Milwaukee MW 122B-8115.

4 Lug Type 3" and Larger (BF4): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-722 and LG-721. Nibco LD 2110-5. Crane 44-FXB-G. Milwaukee ML 132B-8115.

5 Wafer Type 4" and Larger (BF5): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-52U. Nibco WD 3510-8.

6 Lug Type 4" and Larger (BF6): 175 WWP, cast-iron body, gear-operated, nickel-

plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-72U. Nibco LD 3510-8.

7 Grooved Type 4" and Larger (BF7): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-82U. Nibco GD 1765-2.

2.7 Valve Features:

2.7.1 General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.7.2 Valve features specified or required shall comply with the following:

1 Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving. Provide for gate valves 8" and larger.

2 Drain: Comply with MSS SP-45, and provide threaded pipe plugs complying with applicable Division-22 pipe or tube section. Provide for gate valves 8" and larger.

3 Flanged: Provide valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

4 Threaded: Provide valve ends complying with ANSI B2.1.

5 Solder-Joint: Provide valve ends complying with ANSI B16.18.

6 Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

7 Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

8 Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

9 Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

10 Mechanical Actuator: Provide factory-fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve for all valves 4" and larger that are mounted more than 7'-0" above the floor, or are otherwise difficult to operate regardless of height.

3 EXECUTION

3.1 Installation:

3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.

3.1.4 Mechanical Actuators: Install mechanical actuators as recommended by valve manufacturer.

3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

3.2.1 Tube Size 2" and Smaller: Threaded valves.

3.2.2 Pipe Size 2" and Smaller: Threaded valves.

3.2.3 Pipe Size 2½" and Larger: Flanged valves.

3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

3.5 Installation of Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction flow.

END OF SECTION 230523

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SECTION 23 05 29
SUPPORTS, ANCHORS, AND SEALS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Materials and Methods section, and is a part of each Division-21, 22, and 23 section making reference to or requiring supports, anchors, and seals specified herein.

1.3 Extent of supports, anchors, and seals required by this section is indicated on drawings and/or specified in other Division-21, 22, or 23 sections.

1.4 Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.

1.5 MSS Standard Compliance:

1.5.1 Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.

1.5.2 Select and apply pipe hangers and supports, complying with MSS SP-69.

1.5.3 Fabricate and install pipe hangers and supports, complying with MSS SP-89.

1.5.4 Terminology used in this section is defined in MSS SP-90.

1.6 UL Compliance: Provide products which are Underwriters Laboratories listed .

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide supports and hangers by Grinnel, Michigan Hanger Company, B-Line Systems, or approved equal.

2.2 Horizontal-Piping Hangers and Supports: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

2.2.1 Adjustable Steel Clevises: MSS Type 1.

2.2.2 Steel Double Bolt Pipe Clamps: MSS Type 3.

2.2.3 Adjustable Steel Band Hangers: MSS Type 7.

2.2.4 Steel Pipe Clamps: MSS Type 4.

2.2.5 Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.

2.2.6 Single Pipe Rolls: MSS Type 41.

2.2.7 Adjustable Roller Hanger: MSS Type 43.

2.2.8 Pipe Roll Stands: MSS Type 44 or Type 47.

2.3 Vertical-Piping Clamps: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

2.3.1 Two-Bolt Riser Clamps: MSS Type 8.

2.3.2 Four-Bolt Riser Clamps: MSS Type 42.

2.4 Hanger-Rod Attachments: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.

2.4.1 Steel Turnbuckles: MSS Type 13.

2.4.2 Malleable Iron Sockets: MSS Type 16.

2.5 Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

2.5.1 Center Beam Clamps: MSS Type 21.

2.5.2 C-Clamps: MSS Type 23.

2.5.3 Malleable Beam Clamps: MSS Type 30.

2.5.4 Side Beam Brackets: MSS Type 34.

2.5.5 Concrete Inserts: MSS Type 18.

2.6 Saddles and Shields: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

2.6.1 Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6.2 Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation matching adjoining insulation.

2.7 Miscellaneous Materials:

2.7.1 Metal Framing: Provide products complying with NEMA STD ML 1.

2.7.2 Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.

2.7.3 Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

2.7.4 Heavy-Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance with AWS standards.

3 EXECUTION

3.1 Preparation

3.1.1 Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.1.2 Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.2 Installation of Building Attachments:

3.2.1 Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.2.2 In areas of work requiring attachments to existing concrete, use self drilling rod inserts, Phillips Drill Co., "Red-Head" or equal.

3.3 Installation of Hangers and Supports:

3.3.1 General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

3.3.1.1 Horizontal steel pipe and copper tube 1-1/4" diameter and smaller: support on 6 foot centers.

3.3.1.2 Horizontal steel pipe and copper tube 1-1/2" diameter and larger: support on 10 foot centers.

3.3.1.3 Vertical steel pipe and copper tube: support at each floor.

3.3.1.4 Plastic pipe: support in accordance with manufacturer's recommendations and the Florida Building Code, Plumbing.

3.3.1.5 Fire protection piping: support in accordance with NFPA 13.

3.3.2 Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

3.3.3 Paint all black steel hangers with black enamel. Galvanized steel and copper clad hangers do not require paint.

3.3.4 Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

3.3.5 Provision for Movement:

3.3.5.1 Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

3.3.5.2 Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

3.3.5.3 Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

3.3.6 Insulated Piping: Comply with the following installation requirements.

3.3.6.1 Shields: Where low-compressive-strength insulation or vapor barriers are indicated, install coated protective shields.

3.3.6.2 Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

3.3.7 Support fire protection piping independently of other piping.

3.4 Installation of Anchors:

3.4.1 Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

3.4.2 Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

3.4.3 Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and elbows. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.4.4 Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

3.5 Equipment Bases:

3.5.1 Provide concrete housekeeping bases for all floor mounted equipment furnished as part of the work of Division 23. Size bases to extend minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Houskeeping pad for boiler shall be 6” above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.

3.5.2 Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands. Prime and paint with black enamel.

END OF SECTION 230529

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SECTION 23 05 48
VIBRATION ISOLATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to vibration isolation equipment.

1.3 Extent of vibration isolation required by this section is indicated on drawings and/or specified in other Division-23 sections.

1.4 Approval Submittals: When required by other Division-23 sections, submit product data sheets for each type of vibration isolation equipment including configuration and rating data. Submit with Division-23 section using vibration isolation, not as a separate submittal. Provide calculations showing supported weight, deflection, and isolator size and type for each item of supported equipment. Submit for:

Equipment Mountings. Type EM.
Hangers. Type HA.
Bases and Frames. Type BF.
Pipe Flexible Connections. Type PF.

1.5 O&M Data Submittals: Submit a copy of approval submittals for each type of vibration isolation equipment. Include this data in O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated products recommended by manufacturer for use in service indicated. Provide products of types and deflections indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes which properly fit with equipment. All metal parts installed outside shall be hot dipped galvanized after fabrication.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide vibration isolation equipment of: Mason Industries, Keflex, Consolidated Kinetics, Vibration Mountings & Controls, Wheatley or approved equal. All vibration isolators shall be supplied by a single approved manufacturer.

2.3 Equipment Mountings:

2.3.1 Select mountings with the required deflection and fastening means. Provide steel rails or bases as required to compensate for equipment rigidity and overhang.

2.3.2 Types of equipment mountings (EM):

1 Spring Mountings (EM1): Spring isolators shall be free-standing and laterally stable without any housing. All mounts shall have leveling bolts. Spring

diameter shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately one. Provide a nominal static deflection of at least 1.0". Basis of Design: Mason Industries SLFH.

2 Spring Mountings with Housings (EM2): Spring isolators shall consist of open, stable steel springs and include vertical travel limit stops to control extension when weight is removed. The housing of the spring unit shall serve as blocking during erection of equipment. Provide a nominal static deflection of at least 1.0". All mountings used outside shall be hot dipped galvanized. Basis of Design: Mason Industries SLR.

3 Spring Mountings with Housings (EM3): Spring isolators shall consist of open, stable steel springs with neoprene inserts to limit movement between upper and lower housing on start and stop. Provide a nominal static deflection of at least 1.0". Mountings shall be specifically designed for critical areas on light-weight floors. Basis of Design: Mason Industries C.

4 Neoprene Mountings (EM4): Double deflection neoprene-in-shear mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered. The top and bottom surfaces shall be neoprene ribbed and bolt holes shall be provided in the base. Basis of design: Mason Industries ND.

5 Pads (EM5): Waffle or ribbed pattern neoprene pads shall be fabricated from 40-50 durometer neoprene. Provide rigid steel plate and mounting angles as required. Basis of design: Mason Industries Super W.

2.4 Hangers:

2.4.1 Select hangers with the required deflection. Provide all required hanger rods and fasteners.

2.4.2 Types of hangers (HA):

1 Hangers (HA1): Vibration hangers shall contain a steel spring set in a neoprene cup manufactured with a grommet to prevent short-circuiting of the hanger rod. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hanger box lower-hole sizes shall be large enough to permit the hanger rod to swing through a 30-degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Basis of Design: Mason Industries 30.

2 Hangers (HA2): Vibration hangers shall contain a laterally stable steel spring and 0.3" deflection neoprene or fiberglass element in series. A neoprene neck shall be provided where the hanger rod passes through the steel box supporting the isolator mount to prevent metal to metal contact. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of

the rated deflection. Basis of Design: Mason Industries 30N.

3 Hangers (HA3): Double deflection neoprene-in-sheer or EPDM hangers. Units shall be complete with projected neoprene bushing to prevent steel-to-steel contact between hanger box and hanger rod. Average static deflection shall be not less than 0.4 inches. Basis of Design: Mason Industries HD.

2.5 Bases and Frames (BF):

2.5.1 Select mounting bases and frames as required for equipment dimensions, service access and fastening means. Provide all fasteners. Coordinate and provide required vibration isolators to match mounting bases and frames.

2.5.2 Types of bases and frames (BF):

1 Steel Base Frame for Floor-Mounted Equipment (BF1): Provide frames consisting of structural steel sections sized, spaced and connected to form a rigid base which will not twist, rack, deform or deflect in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Frames shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe elbow or duct elbow supports and electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Frames shall include side mounting brackets for attachment to vibration isolation floor mounts. The clearance between the underside of any frame or mounted equipment unit and the top of the building structure below shall be at least 2 inches. Basis of Design: Mason Industries WFSL.

2 Concrete Inertia Block for Floor-Mounted Equipment (BF2): Provide concrete inertia blocks formed of stone-aggregate concrete (150 lbs./cu.ft.) cast between appropriate steel reinforcing perimeter structural steel channels. Inertia block thickness shall be not less than 1/12 the longest dimension of the mounted equipment or equipment assembly. Inertia blocks shall be built to form a rigid base which will not twist, rack, deform, deflect or crack in any manner that will negatively affect the operation of the supported equipment or the performance of the vibration-isolation mounts. Inertia blocks shall be of adequate size and plan form to support basic equipment units and motors plus any associated pipe or duct elbow supports, electrical control elements or other components closely related and requiring resilient support in order to prevent vibration transfer from equipment to the building structure. Inertia blocks shall include side mounting bracket pockets for spring mounting. The clearance between the underside of any inertia block and the top of the building structure below shall be at least 2 inches. The vibration isolator supplier may furnish the structural steel perimeter frame, including reinforcing and anchor bolts. Basis of Design: Mason Industries KSL/BMK.

3 Steel Rails (BF3): Provide steel rails of channels or angles with vibration isolators as required. Basis of Design: Mason Industries, RND or RC.

4 Vibration Isolation Base for Rooftop Equipment (BF4): Provide aluminum

vibration isolation bases that fit over roof curb and under the equipment. Provide spring isolators having a 1" minimum static deflection, resilient snubbers for wind resistance, closed cell weather seal at top and bottom, and EDPM flexible connection around entire perimeter. The unit shall provide a water-tight system. Basis of Design: Mason Industries CMAB.

5 Vibration Isolation Curb for Rooftop Equipment (BF5): Provide steel spring isolation curb with cadmium or zinc electroplated steel springs on ¼" thick neoprene pads to support the upper frame. The upper frame must provide continuous support for the equipment and must be held captive by ¼" thick neoprene snubber bushings. Minimum spring deflection is 1½" . Provide galvanized steel counter-flashing and EPDM bellows for the corners. Provide access covers for all springs. The entire assembly shall be waterproof. Curbs shall be a minimum of 12" high and shall include 2" thick insulation. Provide curbs designed to accommodate for roof pitch so that equipment is set level.

Provide perimeter angle and cross members with two layers of 5/8" waterproof sheetrock at the floating member of the curb. Stagger sheetrock joints. Sheetrock must completely surround all ducts and shall be caulked. Where the mechanical arrangement prevents attaching to the floating member, the barrier shall be attached as high as possible on the fixed curb with 1" thick closed cell neoprene flexible seals around the ducts. A 4" layer of 1.5 pcf fiberglass shall cover the entire solid roof surface under the unit. Basis of Design: Mason Industries RSC-dB.

2.6 Pipe Flexible Connections:

2.6.1 Select pipe flexible connections suitable for duty indicated with ends to match piping system.

2.6. Types of pipe flexible connections (PF):

1 Pump Connections (PF1): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFDEJ with reinforcing rings.

2 Chiller Connections (PF2): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi and 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanges with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFEJ.

3 Coil Connections (PF3): Provide EPDM and dacron or neoprene and nylon flexible connectors rated at 200 psi at 250ºF. Connectors shall have the number of spheres required and ductile iron floating flanged or threaded ends with baked enamel finish. Provide control rods or cables as required for each application. Basis of Design: Mason Industries SFU or SFEJ as required.

4 Stainless Steel Flexible Hoses (PF4): Provide 300 psi working pressure flexible

hoses with corrugated seamless hose body and braided cover. Basis of Design: Mason Industries BSS threaded or RF flanged, as required.

5 Bronze Flexible Hoses (PF5): Provide 300 psi working pressure flexible hoses with corrugated bronze hose body and braided cover. Basis of Design: Mason Industries BBF with sweat ends.

3 EXECUTION

3.1 Install vibration isolation devices for the duty indicated and for ease of inspection, adjustment, and proper operation. Install in accordance with the manufacturer's written instructions and coordinate with shop drawings of supported equipment.

3.2 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.3 Piping, ductwork and conduit shall not be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.

3.4 Equipment Mountings:

3.4.1 Unless otherwise shown or specified, all floor-mounted equipment shall be set on housekeeping equipment bases. Refer to Division-23 section “Supports, Anchors, and Seals”.

3.4.2 No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators, and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.

3.4.3 Align equipment mountings for a free, plumb installation. Isolators that are binding, offset or fully compressed will not be accepted.

3.5 Hangers:

3.5.1 Position vibration isolation hangers so that hanger housing may rotate a full 360 degrees without contacting any object.

3.5.2 Install steel angles, channels, rods and fasteners to level equipment, piping or ductwork and to evenly distribute the supported weight.

3.6 Bases and Frames:

3.6.1 Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the structural steel frame and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked to ensure that no construction debris has been left to short-circuit or restrict the proper operation of the vibration isolation system.

3.7 Pipe Flexible Connections:

3.7.1 Piping connected to vibration isolated equipment shall be installed so that it does not strain or force out of alignment the vibration isolators supporting the basic equipment, nor shall pipes restrict such equipment from "floating" freely on its respective vibration isolation system. Flexible connections shall be used to eliminate transferring vibration along piping.

3.7.2 Flexible connections and hoses shall not be used to compensate for pipe misalignment. Units shall be aligned so that the flexible connection is not distorted perpendicular to the axis of the piping.

3.7.3 Install flexible connections in pump suction and discharge, chiller inlet and outlet, water coil inlet and outlet and where shown on the drawings or required by equipment specifications.

3.7.4 Drain piping connected to vibrating equipment shall not physically contact any building construction or non-isolated systems or components.

3.8 Connections of Ducts: Ducts shall be connected to fan intakes and discharges by means of flexible connectors in accordance with Division-23 section "Ductwork Accessories" so that all vibrating equipment is fully isolated.

END OF SECTION 230548

SECTION 23 05 53
MECHANICAL IDENTIFICATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring identification devices specified herein.

1.3 Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-21, 22, and 23 sections.

1.4 Refer to Division-26 sections for identification requirements of electrical work; not work of this section. Refer to other Division-23 sections for identification requirements for controls; not work of this section.

1.5 Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

2 PRODUCTS

2.1 General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.2 Painted Identification Materials

2.2.1 Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-¼" high letters for ductwork and not less than ¾" high letters for access door signs and similar operational instructions.

2.2.2 Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

2.2.3 Identification Paint: Standard identification enamel.

2.3 Plastic Pipe Markers

2.3.1 Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.

2.3.1.1 Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

2.3.1.2 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.4 Valve Tags:

2.4.1 Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" diameter tags, except as otherwise indicated.

2.4.2 Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" square black tags with white lettering, except as otherwise indicated.

2.5 Engraved Plastic-Laminate Signs:

2.5.1 General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2.5.2 Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8” for larger units.

2.5.3 Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.5.4 Ceiling Grid Mounted Tags: White 1/2:” lettering engraved in a 3/4" black backgound, screwed parallel to the ceiling grid.

2.6 Stamped Nameplates: Provide equipment manufacturer's standard stamped nameplates for motors, AHUs, pumps, etc.

3 EXECUTION

3.1 Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 Ductwork Identification:

3.2.1 General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white. Example: **AHU-1 Supply ➔**

3.2.2 Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.

3.2.3 Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.

3.3 Piping System Identification:

3.3.1 General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

3.3.1.1 Plastic pipe markers.

3.3.1.2 Stenciled markers, black or white for best contrast.

3.3.2 Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.

3.3.2.1 Near each valve and control device.

3.3.2.2 Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

3.3.2.3 Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.

3.3.2.4 At access doors, manholes and similar access points which permit view of concealed piping.

3.3.2.5 Near major equipment items and other points of origination and termination.

3.3.2.6 Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

3.3.2.7 On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.3.3 The following piping shall be color-coded where exposed in mechanical and electrical rooms by completely painting the piping with the indicated color. Use standard colors where exposed in finished spaces. Use standard identification methods in concealed areas.

Fire protection piping - Red
Gas piping – Yellow

3.4 Valve Identification: Provide coded valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. Coordinate code with operating instructions. For valves located above acoustical lay in ceilings provide an additional

engraved plastic valve tag, mechanically affixed to the ceiling grid below the valve (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction.

3.5 Valve Charts: Provide framed, glass covered valve charts in each mechanical room. Identify coded valve number, valve function, and valve location for each valve. Provide floor plan with approximate location of each valve identified.

3.6 Mechanical Equipment Identification: Install engraved plastic laminate sign on a vertical surface on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served. Provide signs for the following general categories of equipment and operational devices: For equipment located above acoustical lay in ceilings provide an additional engraved plastic tag, mechanically affixed to the ceiling grid at the access point (white letters on black background). When multiple equipment and/or valve tags are installed in a room, orient all tags the same direction.

3.6.1 Main control and operating valves, including safety devices.

3.6.2 Meters, gauges, thermometers and similar units.

3.6.3 Fuel-burning units including boilers, furnaces, and heaters.

3.6.4 Pumps, compressors, chillers, condensers, and similar equipment.

3.6.5 Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.

3.6.6 Fans, blowers, primary balancing dampers and VAV boxes.

3.6.7 HVAC air handlers and fan coil units.

3.6.8 Air conditioning indoor and outdoor units.

3.7 Stamped Nameplates: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.]

3.8 Adjusting and Cleaning:

3.8.1 Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.8.2 Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION 230553

SECTION 23 05 56
ACCESS DOORS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring access panels specified herein.

1.3 Approval Submittals:

1.3.1 Product Data: When required by other Division-21, 22, or 23 sections, submit product data for access doors. Submit with Division-21, 22, or 23 section using access doors, not as a separate submittal. Include rating data.

1.4 O&M Data Submittals: Submit a copy of approval submittal. Include this data in O&M Manuals.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Milcor, Jay R. Smith, Zurn, BOICO, Elmdor, or approved equal.

2.2 General: Where floors, walls and ceilings must be penetrated for access to plumbing work, provide types of access doors indicated. Furnish sizes indicated or, where not otherwise indicated, furnish adequate size for intended and necessary access. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.

2.3 Access Door Construction: Except as otherwise indicated, fabricate wall/ceiling door units of welded stainless steel construction with welds ground smooth and brushed finish; 16-gauge frames and 14-gauge flush panel doors; 175° swing with concealed spring hinges; flush screw-driver-operated cam locks.

2.4 Minimum Size: Where equipment is located above hard ceilings, the minimum access door size shall be 24x24 or the minimum size to remove the item serviced.

3 EXECUTION

3.1 Access doors shall be installed to operate and service all plumbing equipment including valves, dampers, duct access panels, and other items requiring maintenance that are concealed above or behind finished construction. Access doors shall be installed in walls, chase and floors as necessary, but are not required in accessible suspended ceiling systems.

3.2 Access doors shall be installed by the Division installing the substrate construction. However, responsibility for furnishing and determining location of access doors is part

of this Division's work. The style of access door shall be suitable for construction into which installed.

3.3 Access doors shall be sized and located as required to provide proper maintenance and service access in accordance with the manufacturer's recommendations and code authority requirements for all devices and equipment.

END OF SECTION 230556

SECTION 23 05 73
EXCAVATION AND BACKFILL

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring excavation and backfill specified herein.

1.3 Refer to other Division-21, 22, and 23 sections and/or drawings for specific requirements of the particular piping system being installed. Where another Division-21, 22, or 23 section or the drawings conflict with requirements of this section, the other Division-21, 22, or 23 section or the drawings shall take precedence over the general requirements herein.

1.4 OSHA: Contractor employee worker protection for all trenching and excavation operations shall comply with 29 CFR 1926.650 Subpart P and all current OSHA requirements.

1.5 Trench Safety Act: Contractor shall comply with all requirements of Florida Statutes Chapter 553, including the requirement to provide a separate line item to identify the cost to comply on a per lineal foot of trench and per square foot of shoring.

2 PRODUCTS

2.1 Sand: Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be of a grade equal to mortar sand.

2.2 Gravel: Clean, well graded hard stone or gravel, free from organic material. Size range to be from No. 4 screen retentions to 1".

2.3 Earth: Fill free of clay, muck, stones, wood, roots or rubbish.

2.4 Identification Tape: Polyethylene 6 inches wide, 0.004 inches thick, continuously printed with "CAUTION" in large letters and type of pipe below.

2.5 Copper Identification Wire: 14-gauge.

3 EXECUTION

3.1 Ditching and Excavation: Shall be performed by hand wherever there is a possibility of encountering obstacles or any existing utility lines of any nature whatsoever. Where clear and unobstructed areas are to be excavated, appropriate machine excavation methods may be employed. Avoid use of machine excavators within the limits of the building lines.

3.2 Bedding: Excavate to bottom grade of pipe to be installed, and shape bed of undisturbed earth to contour of pipe for a width of at least 50% of pipe diameter. If earth conditions necessitate excavation below grade of the pipe, such as due to the presence of clay, muck, or roots, subcut and bring bed up to proper elevation with clean, new sand (as described in paragraph 2.1), deposited in 6" layers and tamped. Notify Architect/Engineer if subcut exceeds 12", or if bed is of an unstable nature. In this case a 6" minimum layer of gravel will be required before sand bedding begins. Submit cost proposal if the earth conditions require subcut in excess of 12" or if gravel is required to achieve proper bedding.

3.3 Placing: Pipe shall be carefully handled into place. Avoid knocking loose soil from the banks of the trench into the pipe bed. Rig heavier sections with nylon slings in lieu of wire rope to avoid crushing or chipping. Pipe which is handled with insulation in place, coated pipe, and jacketed pipe shall have special handling slings as required to prevent damage to the material.

3.4 Backfilling: Deposit clean new sand (as described in paragraph 2.1) to 6" above the pipe and tamp. Then deposit sand or earth carefully in 6" layers, maintaining adequate side support, especially on nonferrous piping materials. Compact fill in 6" layers, using mechanical means, up to the top elevation of the pipe, and in 12" layers to rough or finish grade as required. Fine grade and restore surface to original condition.

3.5 Special: Excavations shall be installed and maintained in satisfactory condition during the progress of the work. Subsurface structures are to be constructed in adequately sized excavations. De-watering equipment shall be installed and properly maintained where required. Shoring shall be employed in the event of unstable soil condition, and in all cases where required by OSHA regulations and necessary to protect materials and personnel from injury.

3.6 Identification: Install identification tape directly above all underground piping, one tape for each pipe where multiple pipes are installed. Depth of tape shall be at least 6 inches below finished grade and 24" above buried pipe. Install copper wire above non-metallic pipes.

3.7 Depth of Cover: Minimum cover for underground piping is two feet unless indicated otherwise.

END OF SECTION 230573

SECTION 23 05 90
START-UP REQUIREMENTS FOR HVAC SYSTEMS

1 GENERAL

1.1 Intent: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

1.2.1 The Contractor shall furnish to the TAB Contractor a complete set of plans, specifications, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.

1.2.2 The Contractor shall participate in a TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for TAB work prior to start of TAB work. The TAB will be performed by an independent company contracted by the owner.

1.3 Test Reports and Verification Submittals:

1.3.1 Submit Startup Report as described herein for each system. Attach Factory Startup Report for equipment as required by other Division-23 sections.

2 PRODUCTS: None

3 EXECUTION:

3.1 The TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.

3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of TAB work.

3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.

3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of TAB work.

3.5 Airside Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.

3.5.1 Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.

3.5.2 Verify that duct systems are clean of debris.

3.5.3 Verify that ducts attached with flexible connectors are aligned within ½" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated.

3.5.4 Verify that filters are clean and filter spacers are installed.

3.5.5 Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.

3.5.6 Verify that fire and smoke dampers are correctly installed and are fully opened.

3.5.7 Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.

3.5.8 Verify proper fan rotation.

3.5.9 Verify proper belt drive alignment.

3.5.10 Verify fan motor overload elements are correctly sized.

3.5.11 Adjust fan sheave until CFM is at or above design CFM. Provide additional sheaves and belts as required. Verify that motor is not overloaded.

3.5.12 Verify that HVAC control systems are fully operational.

3.6 Hydronic Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of HVAC pumps and piping systems.

3.6.1 Verify that the hydronic systems are properly flushed, filled, vented, purged and chemically treated and that all leaks are repaired. Verify proper air venting.

3.6.2 Verify that the correct strainer screens are clean and installed.

3.6.3 Verify that pump/motor shafts are correctly aligned.

3.6.4 Verify proper pump rotation and flow direction.

3.6.5 Verify that all balancing valves and circuit setters are fully opened.

3.6.6 Verify that test ports, pressure gauges and thermometers are properly installed and are accessible at coils, boilers, pumps, and chillers. Extensions to allow for pipe insulation are required. Pressure gauges at pumps must utilize pump taps in order for head measurements to correlate with the pump performance curves.

3.6.7 Verify pump motor overload elements are correctly sized.

3.6.8 Adjust balancing valve at pump discharge until GPM is at or greater than design GPM. Verify motor is not overloaded.

3.6.9 Provide flow meter data (IN WC and GPM), pump performance chart with flow data plotted, actual motor volts/amps, rated motor volts/amps and motor overload element capacity.

3.6.10 Verify that HVAC control systems for coils, boilers, and chillers are fully operational.

3.7 VAV Systems: The Contractor shall provide the following information to the Engineer to substantiate the proper start-up and preliminary adjustments of variable air volume boxes and control systems.

3.7.1 Verify that the inlet duct to the box is straight for a minimum of five (5) inlet duct diameters.

3.7.2 Verify that the discharge duct from the box has no branch takeoffs within five (5) feet of the box discharge.

3.7.3 Set the box thermostat to 85ºF. Verify that the box modulates to minimum cooling, and the heating activates.

3.7.4 Set the box thermostat to 55ºF. Verify that the reverse operation occurs and the box modulates to maximum cooling.

3.7.5 Set box thermostat to 75ºF. Deadband shall not exceed 2ºF.

3.7.6 Set minimum and maximum CFM based on manufacturer's calibration curves.

3.7.7 Verify that the static pressure probe is located 75% of the distance down the longest duct run. Mark the location of the probe on the as-builts and notify the TAB Contractor of same.

3.7.8 Verify that the static pressure control properly modulates the AHU fan's variable frequency drive. Set static pressure controller to maintain 1 in. w.g. as the initial setting.

3.7.9 Verify that the supply air temperature controller properly modulates the chilled water control valve. Set controller to maintain 55ºF. Verify that all heating coil control valves are properly modulated.

3.8 Startup Report: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to meet the written notice described herein prior to starting TAB work. TAB work will not start until the Startup Report has been submitted and approved.

END OF SECTION 230590

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SECTION 23 05 91
TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-21, 22, and 23 section making reference to or requiring the testing and other procedures specified herein.

1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.

1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

2 PRESSURE TESTS

2.1 General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.

2.2 Required test period is four hours.

2.3 No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.

2.4 Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.

2.5 Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.

2.6 During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.

2.7 Repair piping systems sections which fail required piping test. Disassemble and re-install using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

2.8 Pressure Test Requirements:

2.8.1 Soil, Waste, and Vent Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.

2.8.2 Storm Water Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.

2.8.3 Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.

2.8.4 Chilled Water and Heating Hot Water: Perform hydrostatic test at 150% of the normal operating pressure, but not less than 100 psig.

2.8.5 Fire Sprinkler System: Perform hydrostatic test at 200 psig.

2.8.6 Gas: Test with air or nitrogen at 150% of normal working pressure, but not less than 25 psig. The test and check for leaks shall be in accordance with NFPA-54.

3 CLEANING AND STERILIZATION

3.1 General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

3.2 Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.

3.3 Blowdown all gas systems with air or nitrogen (at a rate of flow exceeding design) at least three times or until no residue shows at each outlet. Reverse blowdown systems from smallest piping to largest piping.

3.4 Sterilization of Domestic Water Systems:

3.4.1 Prerequisites: All new hot and cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.

3.4.2 The shut off valve at the water main shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the meter.

3.4.3 The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.

3.4.4 After final flushing, all aerators shall be removed, cleaned, and reinstalled. After final flush the residual chlorine shall not exceed 0.2 parts per million.

3.4.5 The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.

3.4.6 Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

3.5 Chilled Water and Heating Hot Water Pipe Cleaning: After completion of all work and operational check out of the HVAC installations and prior to acceptance of the project by the Owner, the following shall be accomplished. The completed piping systems shall be thoroughly flushed (reversed flushing) as needed to remove all dirt, debris, and any foreign matter that may have been trapped in the piping systems during construction. After flushing of systems is complete, the Contractor shall clean all main strainers and all strainers at air handlers, fan coil units, VAV boxes, reheat coils. A second cleaning of all strainers will be required if requested by the Engineer. Contractor shall furnish and install all valves and piping stub outs in the piping systems as needed to accommodate this flushing operation. Install the valves and stub outs at a location and in a manner that will allow them to remain in place for future flushing operations. The flushing and strainer cleaning operations shall be witnessed and approved by the Engineer and Owner's representative.

3.6 Fuel Gas: Purge all fuel gas systems in accordance with NFPA 54.

END OF SECTION 230591

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SECTION 23 05 93
TESTING AND BALANCING OF MECHANICAL SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section. Division-23 Basic Mechanical Materials Sections apply to work of this section.

1.2 Description of Work:

1.2.1 Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.

1.2.2 Pretesting: Where required by the drawings or other Division 23 sections, pretest existing HVAC systems as directed and report findings prior to start of demolition work or any other modifications to the existing systems. Results of pretesting shall be reported to the Engineer in a timely manner. Comply with standards for final TAB reports described herein.

1.2.3 Coordination: Coordinate with the General Contractor and Mechanical Contractor responsible for the HVAC system installation as required to complete the TAB work.

1.3 The intent of this specification is to balance HVAC systems within the tolerances listed, maintaining the pressure relationships indicated, with a minimum of noise.

1.3.1 Airflow Tolerances:

1.3.1.1 Air Handling: The supply air, return air and outdoor air quantities shall be balanced within ±5% of design values.

1.3.1.2 Exhaust Fans: The exhaust fan quantities shall be set as required to maintain the design exhaust terminal flows within ±5% of design values. If no exhaust terminals exist, exhaust fan air quantities shall be balanced within ±10% of design values.

1.3.1.3 Terminal Units: The air quantities associated with VAV boxes, fan coil units, self-regulating air valves, unit heaters and other similar devices shall be balanced within ±5% of design values.

1.3.1.4 Ceiling Diffusers, Supply Registers, Return and Exhaust Inlets: Balance to an air quantity within ±10% of the design values.

1.3.2 Temperature Tolerances:

1.3.2.1 Air Handling Temperatures: The controlled temperatures at AHUs shall be verified to be under control within ±1ºF of design values.

1.3.2.2 Hot Water Temperatures: The heating hot water controlled temperatures from boilers and heat exchangers and other similar devices shall be under control within ±5ºF.

1.3.2.3 Chilled Water Temperatures: The chilled water controlled temperature from chillers shall be under control within ±1ºF.

1.3.2.4 Room Temperatures: Balance systems and controls within ±2ºF of indicated settings.

1.3.3 Pressure Relationships: Where code or design indicates a specific pressure relationship, the pressure relationship shall take precedence over airflow tolerances. Airflow tolerances may need to be held tighter than allowed tolerances to meet pressure relationships. Demonstrate the existence of positive or negative pressure to Engineer and authority having jurisdiction by making direct measurements of room relative pressure and/or flow direction.

1.3.4 Hydronic Flow: Balance hydronic flow rates to within ±10% of design values.

1.4 Quality Assurance: The TAB Contractor shall be located within 125 miles of the job site and certified as one of the following:

1.5

1.5.1 Tester: A firm certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, who is not the Installer of the systems to be tested and is otherwise independent of the project. Comply with NEBB's "Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems" as applicable to this work.

1.5.2 Tester: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. AABC-certified firms are independent by definition. Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to this work.

1.5.3 Industry Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.

1.6 Job Conditions:

1.6.1 Do not proceed with testing, adjusting, and balancing work until HVAC work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.

1.6.2 Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discarded building materials.

1.6.3 Do not proceed until architectural work that would affect balancing (walls, ceiling,

windows, doors) have been installed.

1.6.4 Testing may proceed system by system, but each HVAC system must be complete as describe herein.

1.6.5 The mechanical contractor shall make any changes in pulleys, belts, and dampers, and/or add dampers as required for correct balancing.

1.7 Approval Submittals

1.7.1 Submit the name of the proposed test and balance company for the Engineer's approval within thirty (30) days after awarding of contract.

1.8 Test Reports and Verification Submittals:

1.8.1 Submit four (4) copies of the dated test and balance report upon completion of TAB work. The report shall include a list of instruments used for the work. The report shall be signed by the supervisor who performed the TAB work. The report shall be certified by a professional engineer (registered in Florida) who is a regular employee of the TAB company.

2 PRODUCTS

2.1 Patching Materials: Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

2.2 Test Instruments: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good condition and shall have been calibrated within the previous six (6) months (or more recently if required by standard).

3 EXECUTION

3.1 General:

3.1.1 Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.

3.1.2 Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards, and as modified or detailed herein.

3.1.3 Test, adjust and balance systems during summer season for air conditioning systems and during winter season for heating systems, including at least a period of operation at outside conditions within 5□F wet bulb temperature of maximum summer design condition, and within 10□F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take

final temperature readings when seasonal operation does permit. The Contractor shall return for a change of seasons test at no additional cost to the Owner and submit the revised TAB report.

3.1.4 Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.

3.1.5 Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.

3.1.6 Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.

3.1.7 Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.

3.1.8 Include in the TAB report recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

3.1.9 Include an extended warranty of ninety (90) days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck, or resetting of any component as listed in test report. The TAB company shall provide technicians and instruments and make any tests required by the Engineer during this time period.

3.2 Controls

3.2.1 Check all HVAC controls for proper location, calibration and sequence of operation.

3.2.2 Check operation of all controllers and controlled devices to verify proper action and direction. Check the operation of all interlocks.

3.2.3 Check all motorized face and bypass zone damper motors for leakage when in closed position. If leakage is more that 5%, mechanical contractor shall reset damper linkages.

3.2.4 Check all control valves for complete closure and correct action under all operating conditions.

3.2.5 Check all labs supply and exhaust system controls. Check setback functions.

3.3 Air Balancing

3.3.1 Leakage tests on ductwork must have been completed before air balancing.

3.3.2 Set dampers, volume controls and fan speeds to obtain specified air delivery with minimum noise level. Rebalance as required to accomplish this. Simulate fully

loaded filters during test.

3.3.3 Set grille deflections as noted on plans. Modify deflections if required to eliminate drafts or objectionable air movement.

3.3.4 Record air terminal velocity after completion of balance work.

3.3.5 Record final grille and register deflection settings if different from that specified on contract drawings.

3.3.6 Record all fan speeds.

3.3.7 Variable Volume Systems: Measure static pressure at all major branches. Adjust fan controllers for minimum required static pressure at the end of each branch. Report the value of the minimum static pressure that will provide proper air flow in the TAB Report and set the static pressure controller for this value. Balance outlets. Check at both modulated and full cooling condition. Traverse main supply and return ducts. Balance the return system. All branches must be above the minimum required static pressure. The supply fan and return fan must track and deliver the proper air quantity with no objectionable noise. The system must be stable and operate properly at 50% load.

3.4 Water Balancing:

3.4.1 Verify proper operation of all hydronic system devices to ensure the proper flowrate, flow direction and pressure are maintained.

3.4.2 Set balancing cocks and flow control devices to obtain specified water flow rates to all terminal units, coils, chillers, boilers, and heat exchangers. Coordinate with variable speed drives to achieve balance with minimum pump speed. Report the value of the minimum differential pressure that will provide proper flow in the TAB Report and set the differential pressure controller for this value. Pump balancing cocks (if present) shall be fully open. Set maximum speed control for variable speed pumps.

3.4.3 Impeller Trim: Record the initial suction and discharge pressure and flow rate of each pump with all cocks fully open. The Engineer will compare this data with the "balanced system" data and will determine if pump impellers should be trimmed for the piping system as installed. Impeller trimming, if required, will be accomplished by change order. Additional TAB work to accomplish impeller trimming shall be performed at no additional cost to the Owner.

3.4.4 Variable Speed Pumps: Verify proper operation of variable speed pumps and the associated distribution system at 50% and 100% flow.

3.5 Boiler Performance

3.5.1 Boilers shall be operating at greater than 50% of full load.

3.5.2 Record the following in addition to other requirements:

1. Boiler nameplate data.
2. Setting of all safety and operating controls.
3. Stack temperature.
4. CO_2 reading in flue gas.
5. Stack smoke.
6. Gas burner pressure.
7. Gas flow.

3.5.3 Calculate the following:

1. Combustion efficiency in %.
2. Boiler output in Btu/hr (500 x GPM X DT).
3. Boiler input in Btu/hr (CFH x HV).
4. Boiler efficiency in % (Output/Input).

3.5.4 Coordination:

1. Coordinate with the boiler factory-trained representative for performance tests.
2. Temperatures and flow rates are required to be recorded elsewhere in this section. These data may be used for the performance calculations provided steady state conditions are established at the required load, and all systems have been balanced and are operating as specified.

3.5.5 Abbreviations:

1. GPM - gallons per minute.
2. DT - temperature difference across boiler.
3. CFH - cubic feet of gas per hour.
4. HV - heating value of gas (Btu/cu. ft.). Obtain from gas company.

3.6 Chiller Performance:

3.6.1 Chiller shall be operating at full load (plus or minus 10%).

3.6.2 Record the following in addition to other requirements:

1. Chiller nameplate data.

2. Compressor head pressure and suction pressure.

3. Refrigerant liquid and suction temperature.

4. Type of refrigerant and charge.

5. Oil pressure.

6. Unit kW consumption (not only amp draw).

7. Ambient air temperature.

3.6.3 Calculate the following:

1. Chiller output in tons (500 x GPM x DT/12,000).

2. Chiller EER at test conditions in Btu/watt hr (Output tons x 12/kW).

3.6.4 Coordination:

1. Coordinate with the chiller factory-trained representative for performance tests.

2. Temperatures and flow rates are required to be recorded elsewhere in this section. These data may be used for the performance calculations provided steady state conditions are established at the required load, and all systems have been balanced and are operating as specified.

3.6.5 Abbreviations:

1. GPM - gallons per minute.

2. DT - temperature difference across chiller.

3. TONS- 12,000 Btu/hr.

4. kW - kilowatts (1,000 watts).

3.7 Data Collection:

3.7.1 In addition to the data required for any specified performance tests, measure and record the temperatures, pressures, flow rates, and nameplate data for all components listed herein.

3.7.2 It is the intent of this section to record data on balanced systems, under normal operating or design conditions.

3.7.3 Temperatures:

1. Outside dry and wet bulb temperatures.

2. Dry bulb temperature in each room and at least one wet bulb temperature in

each zone.

3. Refrigerant liquid and suction temperatures.

4. Inlet and outlet temperature of each heat exchange device - both fluids.

3.7.4 Pressures:

1. Suction and discharge static pressure of each fan.

2. Suction and discharge pressure of each pump.

3. Each refrigerant suction and discharge pressure.

4. Water pressure drop through each heat exchanger.

3.7.5 Flow rates:

1. Flow rate through each fan.

2. Flow rate through each pump.

3. Flow rate through each coil or heat exchange device.

3.7.6 Nameplate Data:

1. Complete nameplate data for all equipment.

2. Motor data to include horsepower, phase, voltage, RPM, full load nameplate current, fuse rating in disconnect switch, number or manufacturer's size designation, and ampere rating of overcurrent and low voltage protection devices in starters.

END OF SECTION 23 05 93

SECTION 23 07 13
EXTERIOR INSULATION FOR DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Rigid duct insulation
Flexible duct insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Knauf, Owens-Corning, Johns Manville, Certainteed.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, coverings, sealers, mastic, and adhesive) with a flame spread rating of 25 or less, and a smoke-developed rating of 50 or less as tested by ANSI/ASTM 84.

2.3 Rigid Fiberglass Insulation Board: ASTM C612, Class 1 (non load bearing). Boards shall be 3 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.4 Flexible Fiberglass Insulation: ASTM C553, Type I, Class B-3 (temperature less than 350ºF). Duct wrap shall be 1 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.5 General Purpose Mastic: Benjamin Foster 35-00 Series, Insulcoustic VIAC Mastic, Childers CP-10, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.6 Vapor Barrier Sealant: Benjamin Foster 30-35, Insulcoustic IC-501, 3M EC-1378, Childers CP-30, or approved equal. Provide "Low Odor" type. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.7 Adhesive: Benjamin Foster 85-20, Insulcoustic IC-205, 3M EC-35, Childers CP-82, Childers CP-89, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.8 Fiber-Glas Mesh: 10x10 Mesh. Foster Mastafab or equal.

3 EXECUTION

3.1 Insulate all rectangular supply, return and outdoor air ductwork exposed in mechanical rooms, mezzanines, fan lofts or in any finished spaces with 1½" thick rigid fiberglass insulation with vapor barrier.

3.2 Installation of Rigid Insulation:

3.2.1 Clean and dry ductwork prior to insulating. Butt insulation firmly together to ensure complete and tight fit over surfaces to be covered. Install insulation materials with smooth and even surfaces. Maintain integrity of aluminum vapor barrier wherever possible. Extend insulation without interruption through walls, floors and similar ductwork penetrations except where otherwise indicated.

3.2.2 Install with facing to the outside with a maximum of 25% compression. Butt all insulation joints firmly together. Longitudinal seam of the vapor retarder must be overlapped a minimum of 2”. Staples shall be outward clinch and placed approximately 6” on center. All penetrations, joints, seams, and damage to the facing shall be sealed with glass fabric and mastic prior to system startup. For rectangular ducts over 24” wide, secure the insulation to the bottom of the duct with mechanical fasteners spaced on 12” centers to reduce sag. Do not overcompress the insulation with the retainer. Larger ducts shall be secured with fasteners on 12-inch centers and 3 inches from all edges.

3.2.3 Apply open mesh glass fabric embedded in vapor barrier mastic. Then apply a second coat of general purpose mastic with aluminum grey color. This finish shall be complete over all rigid insulation.

3.3 Insulate all supply, return and outdoor air ductwork concealed above ceilings, in chases, or elsewhere, and the backs of all ceiling supply outlets with 2" thick fiberglass blanket insulation with vapor barrier.

3.4 Installation of Flexible Insulation:

3.4.1 Insulate round elbows and fittings with wrap such that thickness is equal to adjoining duct covering. Clean and dry ductwork prior to insulating.

3.4.2 Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6-inch wide swaths with 6-inch spaces between swaths. Additionally secure insulation with perforated pins and Tuff-Bond or by self-sticking pins with a 3/8" self-tapping screw. Space on 12-inch centers and 3 inches from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein.

3.4.3 Lap all joints 2 inches and seal joints with 4-inch wide strips of open mesh glass fabric embedded in two coats of general purpose mastic.

3.4.4 Seal all punctures and breaks in aluminum vapor barrier with open mesh glass fabric and vapor barrier sealant.

END OF SECTION 230713

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SECTION 23 07 16
INSULATION FOR HVAC EQUIPMENT AND PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
Cellular glass pipe above ground insulation
Cellular glass equipment insulation
Flexible unicellular piping insulation
Fiberglass equipment insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.

2.3 Pipe Insulation Materials:

2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)

2.3.2 Cellular Glass Pipe Insulation: ASTM C552, Type II, Class 1. (Uncovered.)

2.3.3 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200□F.)

2.3.4 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.

2.3.5 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.

2.3.6 Bedding Compound for CHW Systems: Provide products to completely cover the piping or equipment being insulated. Products shall be low odor type. Foster 30-45 or Foster 95-50.

2.3.7 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option. Provide color coded PVC jacket for all insulated piping exposed inside mechanical rooms. CHW = WHITE; HW = GREY; Domestic Water = BLUE;

2.4 Equipment Insulation Materials:

2.4.1 Rigid Fiberglass Equipment Insulation: ASTM C612, Class 1. (Boards, non-loading bearing, suitable for use to 400°F.)

2.4.2 Flexible Fiberglass Equipment Insulation: ASTM C553, Type I, Class B-3. (Flexible blankets suitable for use to 350°F, 1 pcf).

2.4.3 Cellular Glass Equipment Insulation: ASTM C552, Type I (Flat, uncovered blocks.)

2.4.4 Jacketing Material for Equipment Insulation: Provide 8 ounce canvas jacket, except as otherwise indicated.

2.4.5 Equipment Insulation Compounds: Provide adhesives, cements, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

2.4.6 Equipment Insulation Accessories: Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated.

3 EXECUTION

3.1 General:

3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".

3.1.4 Do not apply insulation to surfaces while they are hot or wet.

3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

3.2.1 Insulate the following piping systems (indoor locations):

3.2.1.1 Heating hot water: up to 1-1/4" pipe - 1½" thick, 1-1/2" thick pipe and over - 2" thick.

3.2.2 Indoor Concealed Locations: Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.

3.2.3 Indoor Exposed and Mechanical Rooms: Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Cover straight piping with smooth, gloss finished, color coded PVC jacket. Use matching factory-made PVC covers for fittings and valves. Provide removable end caps for strainers. Jacketing shall be applied with the longitudinal seam positioned to shed water.

3.2.4 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.

3.2.5 Omit insulation on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

3.3 Cellular Glass Pipe Insulation (Above Ground):

3.3.1 Insulate the following piping systems:

3.3.1.1 Chilled water: smaller than 6" pipe - 1½" thick, 6" and larger pipe - 2" thick.

3.3.2 Indoor Concealed Locations: Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply cellular glass bedding compound to the pipe surface to achieve 100% coverage (chilled water piping only). Apply vapor barrier mastic to all edges of the cellular insulation and

between joints in the insulation. Wire the cellular glass in place with stainless steel wire 9 inches on center. Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over or embedded in the insulation which extend halfway up the pipe insulation cover and at least 4" on each side of the hanger. Insulate anchors adequately to prevent moisture condensation problems. Finish cellular glass insulation in concealed locations by applying a white fire rated jacket with self sealing lap. Finish elbows and fittings with weather barrier sealant reinforced with white glass fabric.

3.3.3 Indoor Exposed and Mechanical Rooms: Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply cellular glass bedding compound to the pipe surface to achieve 100% coverage (chilled water piping only). Apply vapor barrier mastic to all edges of the cellular insulation and between joints in the insulation. Wire the cellular glass in place with stainless steel wire 9 inches on center. Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over or embedded in the insulation which extend halfway up the pipe insulation cover and at least 4" on each side of the hanger. Insulate anchors adequately to prevent moisture condensation problems. Finish cellular glass by applying a heavy coat of weather barrier sealant reinforced with white glass fabric to the exterior of the cellular glass. Cover straight piping with smooth, gloss finished, color coded PVC jacket. Use matching factory-made PVC covers for fittings and valves. Provide removable end caps for strainers. Jacketing shall be applied with the longitudinal seam positioned to shed water.

3.4 Cellular Glass Equipment Insulation:

3.4.1 Insulate the following equipment:

3.4.1.1 Chilled water pumps -2" thick.

3.4.1.2 Chilled water compression tank -1½" thick.

3.4.1.3 Hot water expansion tank -1½" thick.

3.4.2 Carefully cut and fit blocks to curvature of the surface of the equipment in staggered joint fashion. For pumps and other equipment requiring maintenance access, fabricate boxes with removable insulation sections. Chilled water equipment metal surfaces in contact with cellular glass shall be carefully covered with bedding mastic, except pumps and other equipment requiring maintenance access. Apply vapor barrier mastic to all edges and joints in the insulation. Fasten insulation in place with stainless steel wire 9" on centers. Provide heavy coat of vapor barrier sealant over the cellular glass. Embed a layer of open weave glassfab cloth in mastic; overlap joints at least two inches and smooth surfaces. Apply a finish coat of machinery grey general purpose mastic heavy enough to hide weave in cloth and finish to smooth surface.

3.5 Flexible Unicellular Pipe Insulation:

3.5.1 Insulate the following piping systems:

3.5.1.1 Condensate drains from air conditioning units - ½" thick.

3.5.1.2 Refrigerant piping - ¾" thick.

3.5.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.

3.5.3 Insulation outside the building shall be protected by a smooth 0.016" thickness aluminum jacket secured with aluminum bands on 12" centers.

3.6 Fiberglass Equipment Insulation:

3.6.1 Insulate the following equipment:

3.6.1.1 Hot water expansion tank - 1" thick.

3.6.1.2 Hot water heat exchanger - 2" thick.

3.6.2 Coat insulated surfaces with a layer of insulating cement, troweled in a workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges, and depressions, and cover over joints with cement of sufficient thickness to remove surface irregularities. Cover insulated surface with glass cloth jacketing neatly fitted and firmly secured. Lap seams at least 2 inches. Apply over vapor barrier where applicable.

END OF SECTION 230716

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SECTION 23 08 00
HVAC SYSTEMS COMMISSIONING

1 GENERAL

1.1 Intent: This section describes the work performed by the HVAC Commissioning Authority and the supporting work required by the Contractor. The Commissioning Authority will be provided by the Owner. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 Intent of Commissioning Process:

1.2.1 Verify operation and functional performance of HVAC systems for compliance with "Design Intent". "Design Intent" is used to indicate the detailed requirements for the HVAC system, comprised of:

1.2.1.1 Design criteria and assumptions

1.2.1.2 HVAC system description and contract documentation

1.2.1.3 Intended methods of system operation and maintenance

1.2.2 Document HVAC tests and inspections.

1.2.3 Verify application of operation and maintenance manuals, as-built (record) documents, spare parts listing, special tools listing, and other items as may be specified herein for support of HVAC systems and equipment.

1.2.4 Coordinate and direct training to personnel for operation and maintenance of HVAC equipment and systems.

1.3 Contractor Scope of Work: Contractor shall perform all testing and demonstrate system operation to support the Commissioning Authority. Furnish labor and materials to support complete HVAC commissioning as specified herein. Support interim commissioning of HVAC systems during initial season operation and follow-up commissioning of required HVAC systems during additional season operation.

1.4 Quality Assurance:

1.4.1 Reference: ASHRAE Guideline 1-1989, *Guideline for Commissioning of HVAC Systems*.

1.5 Documentation:

1.5.1 Provide the following to the Commissioning Authority:

1.5.1.1 Project plans and specification (contract documents), authorized revisions, approved HVAC shop drawings and submittals, Startup Reports, Test and Balance Reports, factory start-up and certification reports, etc.

1.5.1.2 Records of required code authority inspections, documentation sign-offs, etc.

1.6 Submittals:

1.6.1 HVAC Commissioning Authority will provide the following to the Contractor prior to starting the commissioning process.

1.6.1.1 Commissioning Plan consisting of specific equipment and system checklists.

1.6.1.2 Training Plan outlining required training and documentation.

1.6.2 Contractor shall submit the following prior to starting the commissioning process.

1.6.2.1 O & M Manuals.

1.6.2.2 Startup Reports per Division-15 section 15970.

1.6.2.3 Test and Balance Report per Division-15 section 15985.

1.6.2.4 List of tools and spare parts required by other Division-15 sections.

1.7 Responsibilities:

1.7.1 Contractor:

1.7.1.1 Contractor shall verify completeness of the building envelope, perimeter and interior items which effect proper operation and control of HVAC equipment and systems.

1.7.1.2 The Contractor shall assure participation and cooperation of trade subcontractors (electrical, Test and Balance, controls/energy management, IAQ, and HVAC) under his contract as required for the commissioning process.

1.7.1.3 The Contractor shall secure the services of a professional video service to record all training sessions provided by the subcontractors. All training sessions shall be professionally videotaped and two copies provided to the Owner.

1.7.2 Subcontractors:

1.7.2.1 The subcontractors shall be responsible for providing labor, material, equipment, etc., required within the scope of their specialty to facilitate the

commissioning process. The subcontractors shall perform tests and verification procedures required by the commissioning process when requested by the Commissioning Authority and directed by the Contractor.

1.7.3 Owner:

1.7.3.1 Owner will schedule their personnel to participate in the HVAC Commissioning process. This may include building security personnel, HVAC operation personnel and maintenance personnel. Personnel operating and maintaining equipment and systems will attend training sessions., factory schools, and educational institutions where indicated.

1.7.3.2 Owner shall advise HVAC Commissioning Authority regarding changes in building occupancy and/or usage.

2 PRODUCTS

2.1 Instrumentation: Instrumentation shall be provided by agency performing prior tests. Instruments shall be operated by the individual agency requested by the HVAC Commissioning Authority, as specified elsewhere herein.

3 EXECUTION

3.1 General: The HVAC Commissioning Authority will actively participate in construction phase of the project to assure compliance with HVAC Commissioning requirements.

3.2 Procedure:

3.3 The Contractor and designated subcontractors shall attend a pre-commissioning meeting and establish requirements for HVAC Commissioning. The meeting shall outline:

3.3.1 Responsibility of each trade affected by HVAC Commissioning, as required by appropriate section of the specification and indicated on equipment and system checklists provided by the Commissioning Authority.

3.3.2 Requirements for documentation as listed elsewhere herein.

3.3.3 Requirements for documentation of HVAC test and inspections required by code authorities.

3.3.4 Requirements for the HVAC Commissioning program during specified operational seasons, part and full loads and as further delineated in Paragraph 3.4.

3.3.5 Format for training program for operation and maintenance personnel.

3.4 HVAC Commissioning:

3.4.1 To assist in the commissioning process, Operation and Maintenance manuals shall be completed and turned over to the Commissioning Authority as soon as possible during the course of the project, but in no case later than one month prior to the initial date scheduled for substantial completion.

3.4.2 The Commissioning Authority will develop and submit a specific start-up, check-out and sign-off form for every piece of major equipment and system, as well as other equipment hereinafter listed. These forms and lists do not necessarily indicate all the activities, tests and procedures which will be required for the commissioning and start-up of each piece of equipment and system.

3.4.3 The Contractor shall develop a work plan to demonstrate system and equipment operation. Systems shall be operated under actual or simulated full load conditions. Identify the operating conditions in the work plan. Where appropriate, systems shall be operated, tested, and started up, to assure operation for each of their seasonal or different characteristics, (for example heating and cooling).

3.4.4 After all components and every system has been completely commissioned, provide a 2-week, 24-hour per day fully functional automatic operation period of all systems simultaneously. This shall be successfully concluded before systems are accepted by the Owner.

3.4.5 Execute the final approved start-up and commissioning plan.

3.4.6 HVAC Commissioning shall begin only after HVAC equipment and systems, along with related equipment, systems, structures and areas are complete. Systems may be commissioned individually if requested by the Contractor and approved by the Commissioning Authority.

3.4.6.1 Verify Test and Balance readings, such as:

3.4.6.1.1 Supply and return air volumes

3.4.6.1.2 Fan performance

3.4.6.1.3 Hydronic performance

3.4.6.1.4 Branch duct readings

3.4.6.1.5 Chiller performance

3.4.6.1.6 Cooling tower performance

3.4.6.2 Verify calibration of thermostats and related controls, such as:

3.4.6.2.1 VAV boxes

3.4.6.2.2 Fan coil units

3.4.6.2.3 Damper settings

3.4.6.2.4 Valve positions

3.4.6.3 Verify readings of remote data and control systems (Energy Management Control System), such as:

3.4.6.3.1 Temperatures

3.4.6.3.2 Air Flows

3.4.6.3.3 Damper positions

3.4.6.3.4 Differential pressures

3.4.6.3.5 Water temperatures

3.4.6.4 Verify operation of smoke removal system modes, as follows:

3.4.6.4.1 Smoke damper and fan operation

3.4.6.4.2 Smoke detector response

3.4.6.4.3 Smoke zone response

3.4.6.4.4 Smoke control panel manual operation

3.4.6.5 Verify that the total HVAC system is performing to provide conditions as outlined in "Design Intent", for seasonal full load and part load conditions, as follows:

3.4.6.5.1 Temperature

3.4.6.5.2 Humidity

3.4.6.5.3 Air changes

3.4.6.5.4 Air movement

3.4.6.5.5 Air quality

3.4.6.5.6 Zone control

3.4.6.5.7 Energy Management

3.4.6.5.8 Pressurization

3.4.6.5.9 Control response

3.5 HVAC Start-Up Procedures:

3.5.1 Prior to start-up of any air handling equipment, the Commissioning Authority and the Contractor shall inspect the installation and verify that:

3.5.1.1 Ductwork is complete, clean and pressure-tested per specifications.

3.5.1.2 Prefilters and final filters are installed by the Contractor per design specifications; prefilters are to be replaced by the Contractor as required during this start-up period. The final filters shall be replaced by the Contractor any time that the static pressure drop across the filter exceeds 1.0". The filters installed shall meet design specifications and shall be dated with a felt-tip marker upon installation.

3.5.1.3 All electrical work is complete.

3.5.1.4 Safety devices are in place and operational.

3.5.1.5 Energy Management controls are installed and have been verified to be operational by the controls contractor.

3.5.1.6 All piping has been installed and insulated per specifications.

3.5.2 Prior to Occupancy:

3.5.2.1 No less than two weeks prior to substantial completion, the HVAC system for the space to be occupied shall be approved by the Commissioning Authority to be operational under the start-up procedures and shall be set up by the Contractor to operate continuously on a 24-hour basis. The following requirements shall be established by the Commissioning Authority and adhered by to the contractors during this period:

3.5.2.1.1 The Energy Management Control System is completely installed, and the EMCS Contractor has submitted a statement verifying that the system is complete and operational.

3.5.2.1.2 The HVAC air side and water systems shall be balanced at design levels by the Contractor, all systems and devices shall be operating according to specifications, and the Contractor's TAB report has been submitted to an approved by the HVAC system Design Engineer.

3.5.2.1.3 Outdoor air shall be set at maximum design levels and maintained at those

levels continuously during the two-week ventilation period.

3.5.2.1.4 Chilled water temperature (where applicable) shall be operating at design levels. Supply air off-coil temperatures shall be at design levels.

3.5.2.1.5 All exhaust systems are operational and functioning according to design CFM and specifications.

3.5.2.1.6 All electric heaters and hydronic reheat systems are installed and operational.

3.5.2.1.7 Prefilters shall continue to be replaced by the Contractor as required per the start-up schedule. The final filter shall be replaced by the Contractor at any time that the static pressure drop across the filter exceeds 1.0".

3.5.2.1.8 All interior spaces are secured with doors and windows normally closed.

3.5.2.1.9 Interior air quality shall be maintained at 75ºF and relative humidity less than 60%.

3.5.3 At Occupancy: Following the date of final completion and prior to occupancy, the Commissioning Authority shall verify all prefilters and final filters have been replaced with new, approved, specified filters.

END OF SECTION 230800

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SECTION 23 09 13
VARIABLE FREQUENCY DRIVES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of variable frequency drive work required by this section is indicated on drawings and schedules, and by requirements of this section. Motor characteristics are specified in Division-23 section “Electric Motors”. Control sequences are specified in the mechanical drawings.

1.4 Refer to other Division-23 sections for installation of pumps, AHUs, pressure taps, and flow stations in mechanical systems; not work of this section. Coordinate with pump and air handling unit suppliers.

1.5 Refer to Division-26 sections for the following work; not work of this section.

1.5.1 Power supply wiring for power source to power connection on pumps, air handling units, drives, controls and/or unit control panels.

1.6 Provide the following electrical work as work of this section, complying with requirements of Division-16 sections: Control wiring and signal wiring between field-installed controls, indicating devices, and unit control panels.

1.7 Codes and Standards:

1.7.1 Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.

1.7.2 NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.

1.7.3 NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.7.4 NEC Compliance: Comply with NFPA 70 National Electric Code.

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's technical product data for each type of drive furnished, indicating dimensions, capacities, performance characteristics including harmonic contributions, electrical characteristics, finishes of materials, and including installation instructions and start-up instructions.

1.9 Test Reports and Verification Submittals:

1.9.1 Submit manufacturer's representative startup report.

1.10 O&M Data: Submit maintenance instructions and spare parts lists. Include this data, a copy of approval data in O&M manual.

2 PRODUCTS

2.1 General: Provide products in sizes and capacities indicated, consisting of variable frequency drives, bypass devices, disconnects, controllers, sensors, transmitters, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard system components as indicated by published product information, designed and constructed as recommended by manufacturer.

2.2 Variable Frequency Drives: Provide UL or ETL approved, variable torque, variable frequency drives capable of being used with AC induction motors without causing overheating or excessive noises. Drives shall be housed in NEMA 1 enclosures. The supplier shall perform all necessary electric power analyses as required to ensure the drives operate properly in the service indicated. Provide the following performance and construction features:

2.2.1 The drive may be either voltage or current source, but current source drives must incorporate a voltage clamping circuit. Drives must be able to be tested under no-load conditions.

2.2.2 The controller shall accept power as indicated on the drawings and provide a variable frequency output for speed control from 10% to 100% of base speed (1,800 rpm nominal). Provide fused input.

2.2.3 The drive shall produce a variable frequency, adjustable voltage output with a constant input power factor of at least 0.95 and a variable-torque constant volts/Hz ratio. The input stage shall use a full wave diode bridge. Provide DC switching power supply.

2.2.4 The drive shall maintain an overall efficiency from input to output of at least 95% over the full range of operation.

2.2.5 The output stages shall not generate unacceptable line noise, motor noise, or radio frequency interference. Any isolation transformers, filters, or other devices required to prevent these problems, or to enable the drive to function properly with the available utility power shall be provided by the manufacturer.

2.2.6 All units shall be warranted for a period of 18 months. All drives shall be pretested before shipment.

2.2.7 Drive features:

2.2.7.1 Minimum and maximum speed adjustment.

2.2.7.2 Separately adjustable acceleration and deceleration.

2.2.7.3 Adjustable current limit.

2.2.7.4 Short circuit protection and ground fault protection. Over current protection for driven load shall comply with NEC.

2.2.7.5 4-20 mA current follower circuitry.

2.2.7.6 Under voltage and over voltage protection.

2.2.7.7 Over temperature protection.

2.2.7.8 Automatic restarting of the drive after a power outage or power dip.

2.2.7.9 Drive status indicator lights and digital display.

2.2.7.10 Mode selector switch (manual, off, automatic).

2.2.7.11 Manual speed potentiometer.

2.2.7.12 Speed indicator and ammeter to indicate full range of operation.

2.2.7.13 Motor starter circuit and drive input disconnect switch complying with NEC Article 430.

2.2.7.14 Phase loss protection (input and output) and surge suppression.

2.2.7.15 Start/stop control in any mode from a remote signal or contact closure.

2.2.7.16 Auxiliary contact indicating run status.

2.2.7.17 BACnet MS/TP interface.

2.2.7.18 Internal diagnostics displayed on unit panel.

2.2.7.19 Drives shall be able to catch and drive into a spinning load.

2.2.8 Acceptable Manufacturers: Subject to compliance with requirements, provide drives of one of the following:

Toshiba
Magnetek
Asea Brown Boveri
Yaskawa

3 EXECUTION

3.1 Examine areas and conditions under which variable volume systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 Install the variable frequency drives where shown on the drawings in accordance with the manufacturer's printed instructions. If the drive is not located within sight of the motor, provide additional line side disconnect switch complying with the requirements of Division 21 and NEC Article 430.

3.3 Mounting: Provide slotted angles or channel bars with mounting hardware for securing drives to the wall. Combustible materials are not permitted.

3.4 Refer to Division-26 sections for motor connections and testing requirements.

3.5 Variable Volume Pumping Systems:

3.5.1 System Adjustment: The drive supplier shall coordinate the setting of all adjustments and setpoints for initial operation. The system and all pumps and control valves shall be monitored for proper operation. It shall be recognized that final settings will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid.

3.6 Variable Air Volume Systems:

3.6.1 Verify that the drives control the air handling unit speeds properly over the full range of operation in response to control signals. Coordinate drive operation with final sheave selection.

3.6.2 System Adjustment: The drive supplier shall coordinate the setting of all adjustments and setpoints for initial operation. Monitor system boxes and AHUs for proper operation. It shall be recognized that final settings and locations of static pressure transmitters will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid. Coordinate with TAB Contractor to determine minimum fan speed to achieve minimum scheduled supply and outside air flows.

3.7 Start-up: Start-up, test, and adjust variable volume systems in conjunction with DDC contractor and manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.

3.8 Owner's Instructions: Provide services of manufacturer's technical representative for one 4-hour day to instruct Owner's personnel in operation and maintenance of variable frequency drives. Schedule instruction with Owner, provide at least 7-day notice to Contractor and Engineer of training date.

3.9 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the variable volume system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

END OF SECTION 230913

SECTION 23 09 23
DIRECT DIGITAL CONTROLS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of Energy Management Control and DDC Systems (EMCS/DDC) work required by this section is indicated on drawings and input/output schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for installation of instrument wells, valve bodies and dampers in mechanical systems; not work of this section.

1.5 Refer to Division-26 sections for the following work; not work of this section. Power supply wiring for power source to power connection on controls and/or EMCS panels. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.6 Provide the following electrical work as work of this section, complying with requirements of Division-26 sections: Control wiring between field-installed controls, equipment, indicating devices, and EMCS/DDC panels.

1.7 Codes and Standards:

1.7.1 Electrical Standards: Provide electrical products which have been tested, listed and labeled by UL and comply with NEMA standards.

1.7.2 NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electric control systems.

1.7.3 NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems" where applicable to controls and control sequences.

1.7.4 Federal Communication Commission (FCC) as required.

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's technical product data for each EMCS/DDC panel and control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials. Include installation instructions and start-up instructions. Provide technical specification data for each component and software module.

1.8.2 Shop Drawings: Submit shop drawings for the EMCS/DDC containing the following

information:

1.8.2.1 Schematic flow diagram of system showing fans, pumps, coils, dampers, valves, and control devices.

1.8.2.2 Label each control device with setting or adjustable range of control.

1.8.2.3 Indicate all required electrical wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. The point-to-point wiring diagram shall show all interconnections.

1.8.2.4 Provide details of faces of EMCS/DDC panels, including controls instruments and labeling.

1.8.2.5 Include written description of sequence of operation.

1.8.2.6 Provide a scaled floor plan drawing showing location of all conduit, control cabling, junction boxes, control devices, and surge suppression devices.

1.9 Test Reports and Verification Submittals:

1.9.1 Submit system verification letter from manufacturers representative stating that all HVAC controls have been checked, calibrated, started up and verified for proper operation. State that the Owner training has been completed and provide a roster of attendees.

1.10 O&M Data Submittals:

1.10.1 Maintenance Data: Submit maintenance instructions and spare parts lists for each type of control device. Include that type data, and a copy of all approval submittals in O&M Manual.

1.10.2 System Manual: In addition to the maintenance data requirements, provide an EMCS/DDC Owner's Manual in a separate binder specifically for this project. This manual shall provide a description of the information flow to and from panels and devices and shall describe the overall communications network. The manual shall also include operating instructions, block diagrams, schematics, schedules, and system descriptions. Instruct Owner's personnel with this manual during the required training periods.

1.10.3 Software: Submit a copy of all software.

1.10.4 Service: Submit name, address, and telephone number of company that will provide service and training for the system.

1.10.5 As-Built Drawings: Provide a scaled floor plan drawing showing location of all conduit, control cabling, junction boxes, control devices, and surge suppression devices.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide

EMCS/DDC control systems of one of the following:

Trane
Schneider Electric I/A Series

2.2 General: Provide EMCS/DDC control products in sizes and capacities indicated, consisting of valves, dampers, sensors, controllers and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide an EMCS/DDC controls system with the following functional and construction features as indicated. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall utilize BACnet MSTP (RS485) communications.

2.2.1 Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/MSTP (RS485) as prescribed by the BACnet standard. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.

2.2.2 The Controls Contractor shall provide all communication media, connectors, repeaters and network switches routers necessary for the high speed Ethernet communications network.

2.2.3 All values within the system (i.e. schedules, datalogs, points, software variables, custom program variables) shall be readable and controllable (where appropriate) by any System Controller or BACnet Workstation on the communications network via BACnet.

2.3 Quality Assurance:

2.3.1 Provide equipment of firms regularly engaged in manufacture of EMCS/DDC equipment, of types required, whose products have been in satisfactory use in similar service for not less than three years. Provide evidence that software has been in use satisfactorily for at least one year.

2.3.2 Contractor shall have at least three years experience in the installation and servicing of EMCS/DDC equipment similar to that being installed. Contractor shall have an office within 100 miles of the project and shall maintain a remote terminal capable of communication with the EMCS/DDC during the year warranty period.

~~2.4~~ Control Valves: Provide factory-fabricated pressure independent electric control valves with constant differential pressure across the control valve for 100% valve authority. The valve shall accurately control the flow with an operating pressure differential range of 4 to 60 psi. Provide pressure regulation with EDPM diaphragm, stainless steel spring, and pressure control disc. Pressure control seats shall be brass construction with vulcanized EPDM. The valve shall be adjustable to indicate percentage of valve flow range, utilizing an adjustment collar and lock mechanism. Where type or body material is not indicated, provided selection as determined by manufacturer for installation requirements and pressure class, based on maximum

pressure and temperature rating of piping system. Provide valve size in accordance with scheduled or specified maximum pressure drop across control valve. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve motors with proper shutoff ratings for each individual application.

2.4.1 Acceptable Manufacturers: Danfoss, Belimo, Griswold, Bell & Gossett, Flow Design Inc.

2.5 Dampers: Refer to Division-23 Section "Ductwork Accessories" for dampers. Actuators are work of this section.

2.6 Actuator Motors: Size each motor to operate dampers or valves with sufficient reserve power to provide smooth modulating action or two position action as specified.

2.6.1 Provide permanent split-capacitor or shaded pole type motors with gear trains completely oil-immersed and sealed. Equip spring-return motors, where indicated on drawings or in operational sequence, with integral spiral-spring mechanism. Furnish entire mechanism in housing designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.

2.6.2 Equip motors for outdoor locations and for outside air intakes with "O-ring" gaskets designed to make motors completely weatherproof, and equip with internal heaters to permit normal operation at 10ºF.

2.6.3 Furnish non-spring return motors for dampers larger than 25 sq. ft. and for valves larger than 2½". Size for running torque rating of 150 inch-pounds and breakaway torque rating of 300 inch-pounds. Size spring-return motors for running torque rating of 150 inch-pounds and breakaway torque rating of 150 inch-pounds.

2.7 EMCS/DDC Associated Components:

2.7.1 Provide field-programmable microprocessor-based, stand-alone EMCS/DDC panels as specified herein. The EMCS/DDC panel manufacturer shall be responsible for the complete engineering of the panel. The panel shall be UL listed and housed in a key locked metal cabinet. Parts shall be plug in (modular) for easy repair or expansion. Power input shall be 24V or 120 V. Relays and contacts shall be rated at 24 VA at 24 VAC or 125 VA at 120 and 230 VAC, as required.

1. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
2. The controller shall provide a USB communications port for connection to a PC
3. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
4. All System Controllers shall have a real time clock.
5. Data shall be shared between networked System Controllers.
6. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
   a. Assume a predetermined failure mode.
   b. Generate an alarm notification.

c. Create a retrievable file of the state of all applicable memory locations at the time of the failure.
d. Automatically reset the System Controller to return to a normal operating mode.

7. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40 F to 122 F.
8. Clock Synchronization.
   a. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.
   b. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
   c. All System Controllers shall automatically adjust for daylight savings time if applicable.
9. Serviceability
   a. Provide diagnostic LEDs for power, communications, and processor.
   b. The System Controller shall have a display on the main board that indicates the current operating mode of the controller.
   c. All wiring connections shall be made to field removable, modular terminal connectors.
   d. The System controller shall utilize standard DIN mounting methods for installation and replacement.
10. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller
11. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage
12. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs.

2.8 EMCS/DDC Functions: Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the operator interface.

1. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:
   a. Weekly Schedule. Provide separate schedules for each day of the week.
   b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
   c. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.

d. Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less then and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.

2. Trend Log Application
   a. Trend log data shall be sampled and stored on the System Controller panel and shall capable of being archived to a BACnet Workstation for longer term storage.
      1) Trend logs shall include interval, start-time, and stop-time.
      2) Trend log intervals shall be configurable as frequently as 1 minute and as infrequently as 1 year.
   b. Automated Trend Logs.
      1) The system controller shall automatically create trend logs for defined key measurements for each controlled HVAC device and HVAC application.
      2) The automatic trend logs shall monitor these parameters for a minimum of 7 days at 15 minute intervals. The automatic trend logs shall be user adjustable.
3. Alarm/Event Log
   a. Any object in the system shall be configurable to generate an alarm when transitioning in and out of a normal or fault state.
   b. Any object in the system shall allow the alarm limits, warning limits, states, and reactions to be configured for each object in the system.
   c. An alarm/event shall be capable of triggering any of the following actions:
      1) Route the alarm/event to one or more alarm log. The alarm message shall include the name of the alarm location, the device that generated the alarm, and the alarm message itself.
      2) Route an e-mail message to an operator(s)
      3) Log a data point(s) for a period of time
      4) Run a custom control program
4. VAV System Coordination. Provide applications software to properly coordinate and control the VAV system to ensure equipment safety and minimize energy use. This application shall perform the following functions:
   a. Startup and shutdown the air handler safely. Ensure the VAV boxes are open sufficiently when the air handler is running, to prevent damage to the ductwork and VAV boxes due to high air pressure.
   b. Calibrate VAV boxes.
   c. Fan Pressure Optimization (ASHRAE 90.1) - Minimize energy usage by controlling system static pressure to the lowest level while maintaining zone airflow requirements. System static pressure controlled to keep the “most open” zone damper between 65% and 75% open.
      1) The Fan Pressure Optimization application shall have the ability to identify and display the discharge air setpoint of the air-handler and the VAV box that serves the critical zone (e.g., the zone with the most open VAV box damper). This information shall dynamically update with changes in the location of the critical zone.

2) During commissioning, and with the engineer/owner, the controls contractor shall confirm the performance of Fan Pressure Optimization by conducting a field functional test that demonstrates critical zone reset.

5. Point Control. User shall have the option to set the update interval, minimum on/off time, event notification, custom programming on change of events.
6. Timed Override. A standard application shall be utilized to enable/disable temperature control when a user selects on/cancel at the zone sensor, operator interface, or the local operator display. The amount of time that the override takes precedence will be selectable from the operator interface.
7. Anti-Short Cycling. All binary output points shall be protected from short cycling

2.9 Operator Interface:

1. Operator Interface
   a. The operator interface shall be accessible via a web browser.
   b. The operator interface shall support the following Internet web browsers:
      1) Internet Explorer 8.0+
   c. The operator interface shall support the following mobile web browsers:
      1) iOS (iPad/iPhone) V4.0+
      2) Android (Phone) V2.3+
2. Mobile App Operator Interface
   a. Mobile App Operator Interface shall support the following Operating systems
      1) Apple iOS 5
      2) Apple iOS 6
      3) Android V2.3
      4) Android V4.0
      5) Android V4.1
   b. The operator interface shall support system access on a mobile device via a mobile app to:
      1) Alarm log
      2) System Status
      3) Equipment status
      4) Space Status
      5) Standard Equipment graphics
   c. The operator interface shall support actions on a mobile device via a mobile app to:
      1) Override set points
      2) Override occupancy
      3) Acknowledge Alarms
      4) Comment on Alarms
   d. System Security
      1) Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
      2) User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
      3) Each operator shall be allowed to change their user password
      4) The System Administrator shall be able to manage the security for all other users
      5) The system shall include pre-defined “roles” that allow a system administrator to quickly assign permissions to a user.
      6) User logon/logoff attempts shall be recorded.

7) The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
8) All system security data shall be stored in an encrypted format.

e. Database
1) Database Save. A system operator with the proper password clearance shall be able to archive the database on the designated operator interface PC.
2) Database Restore. The system operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.

f. On-Line Help and Training
1) Provide a context sensitive, on line help system to assist the operator in operation and configuration of the system.
2) On-line help shall be available for all system functions and shall provide the relevant data for each particular screen.

g. System Diagnostics
1) The system shall automatically monitor the operation of all network connections, building management panels, and controllers.
2) The failure of any device shall be annunciated to the operators.

h. Equipment & Application Pages
1) The operator interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:
a) Animated Equipment Graphics for each major piece of equipment and floor plan in the System. This includes:
(1) Each Chiller, Air Handler, VAV Terminal, Fan Coil, Boiler, and Cooling Tower. These graphics shall show all points dynamically as specified in the points list.
(2) Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog outputs, such as valve or damper positions. Graphics shall be capable of launching other web pages.
b) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
c) Historical Data (As defined in Automatic Trend Log section below) for the equipment or application without requiring a user to navigate to a data log page and perform a filter.

i. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.
1) Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
2) Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.

3) Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
4) Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
5) Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).

j. Custom Graphics
1) The operator interface shall be capable of displaying custom graphics in order to convey the status of the facility to its operators.
2) Graphical Navigation. The operator interface shall provide dynamic color graphics of building areas, systems and equipment.
3) Graphical Data Visualization. The operator interface shall support dynamic points including analog and binary values, dynamic text, static text, and animation files.
4) Custom background images. Custom background images shall be created with the use of commonly available graphics packages such as Adobe Photoshop. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as GIF and JPEG.

k. Graphics Library. Furnish a library of standard HVAC equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program.

l. Manual Control and Override.
1) Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
2) Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
3) Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.
4) Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.

m. Engineering Units
1) Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.
2) Unit selection shall be able to be customized by locality to select the desired units for each measurement.
3) Engineering units on this project shall be IP.

3. Scheduling. A user shall be able to perform the following tasks utilizing the operator interface:
a. Create a new schedule, defining the default values, events and membership.
b. Create exceptions to a schedule for any given day.
c. Apply an exception that spans a single day or multiple days.

d. View a schedule by day, week and month.
e. Exception schedules and holidays shall be shown clearly on the calendar.
f. Modify the schedule events, members and exceptions.

4. Trend Logs
   a. Trend Logs Definition.
      1) The operator interface shall allow a user with the appropriate security permissions to define a trend log for any data in the system.
      2) The operator interface shall allow a user to define any trend log options as described in the Application and Control Software section.
   b. Trend Log Viewer.
      1) The operator interface shall allow Trend Log data to be viewed and printed.
      2) The operator interface shall allow a user to view trend log data in text-based (time –stamp/value).
      3) The operator shall be able to view the data collected by a trend log in a graphical chart in the operator interface.
      4) Trend log viewing capabilities shall include the ability to show a minimum of 5 points on a chart.
      5) Each data point trend line shall be displayed as a unique color.
      6) The operator shall be able to specify the duration of historical data to view by scrolling and zooming.
      7) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis.
   c. Export Trend Logs.
      1) The operator interface shall allow a user to export trend log data in CSV or PDF format for use by other industry standard word processing and spreadsheet packages.
5. Alarm/Event Notification
   a. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
   b. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any operator interface.
      1) The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
      2) Alarm/event messages shall use full language, easily recognized descriptors.
      3) An operator with the proper security level may acknowledge and clear alarms/events.
      4) All alarms/events that have not been cleared by the operator shall be stored by the building controller.
      5) The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.
   c. Alarm Processing.
      1) The operator shall be able to configure any object in the system to generate an alarm when transitioning in and out of a normal state.
      2) The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.
6. Reports and Logs.
   a. The operator interface shall provide a reporting package that allows the operator to select reports.

b. The operator interface shall provide the ability to schedule reports to run at specified intervals of time.
c. The operator interface shall allow a user to export reports and logs from the building controller in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Acceptable formats include:
   1) CSV, HTML, XML, PDF
d. Reports and logs shall be readily printed to the system printer.
e. Provide a means to list and access the last 10 reports viewed by the user.
f. The following standard reports shall be available without requiring a user to manually configure the report:
   1) All Points in Alarm Report: Provide an on demand report showing all current alarms.
   2) All Points in Override Report: Provide an on demand report showing all overrides in effect.
   3) Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
   4) Points report: Provide a report that lists the current value of all points

7. VAV Air System. An operator shall be able to view and control (where applicable) the following parameters via the operator interface:
   a. System Mode
   b. System Occupancy
   c. Ventilation (Outdoor air flow) setpoint
   d. Ventilation (Outdoor air flow) status
   e. Air Handler Static pressure setpoint
   f. Air Handler Static pressure status
   g. Air Handler occupancy status
   h. Air Handler Supply air cooling and heating set points
   i. Air Handler minimum, maximum and nominal static pressure setpoints
   j. VAV box minimum and maximum flow
   k. VAV box drive open and close overrides
   l. VAV box occupancy status
   m. VAV box Airflow to space
   n. Average space temperature
   o. Minimum space temperature
   p. Maximum space temperature
8. Chilled Water System. An operator shall be able to view and control (where applicable) the following parameters via the operator interface:
   a. System mode of the chiller plant
   b. Chiller enable/disable status
   c. System supply water setpoint
   d. System supply and return water temperature
   e. System Chilled water pump status
   f. System Chilled water flow
   g. Bypass pipe flow rate (if applicable)
   h. Chiller or system failure information
9. Custom Application Programming. Provide the tools to create, modify, and debug custom application programming. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded.

10. Custom Graphic Editor. Provide the tools to create, modify, and debug custom graphics. The operator shall be able to create, edit, and download custom graphics at the same time that all other system applications are operating. The system shall be fully operable while custom graphics are edited, compiled, and downloaded.

2.10 Associated Hardware: Provide actuators, relays, and other interface devices as required to execute the indicated control functions.

2.11 EMCS/DDC Input Devices:

2.11.1 Temperature Sensors: Provide nickel resistance temperature detector (RTD) type sensors for duct, well or room mounting as required by duty indicated. Accuracy: plus or minus 0.5ºF.

2.11.2 Temperature Transmitters: Provide 3 or 4 wire resistance temperature detector (RTD) type transmitters for duct, well or room mounting as required by duty indicated. Provide metal enclosure sealed against moisture. Accuracy: plus or minus 0.25ºF. Install wells to accommodate sensors. Wells must be of sufficient size to allow insertion of an electronic probe with the sensor for calibration. Accutech AI-1000 or approved equal.

2.11.3 Current Transformers: Provide current transformers (and potential transformers if required) and all associated interface equipment for sensing kW demand.

2.11.4 Hydronic Differential Pressure Transmitter: Provide self-contained, variable capacitance type differential pressure transmitters with the following features. Subject to compliance with requirements, provide transmitters of one of the following: Rosemont, Foxboro, Leslie, Yokagawa.

a. Sealed electronics compartment, suitable for duty at 90ºF, 100% RH. Provide NEMA 4 enclosure.
b. Output 4-20 ma DC, isolated linear signal.
c. Design pressure: 2000 psi, design overrange differential: 2000 psi with minimal adverse affect on output.
d. Accuracy: plus or minus 0.25% of span.
e. Stability: plus or minus 0.25% of range limit.
f. Provide zero and span adjustments. Set span for each transmitter based on duty, not at maximum unless required.

2.11.5 Differential and Static Pressure Sensors (Air): Provide 0-6" w.g. adjustable in 2" w.g. span pressure sensors with ±0.5% full scale accuracy. Provide zero and span adjustments. Provide over-pressure protection to 10 psig positive or negative.

2.11.6 Differential Pressure Switches (Air): Provide 0.05 to 5" w.g. differential pressure switches with adjustable setpoint and SPDT contact rated for duty indicated. Provide over-pressure protection to 1 psig positive or negative.

2.11.7 Insertion Type Flowmeters: Provide electromagnetic insertion type flowmeters suitable for measuring electrically conductive liquids at a flow range velocity of 0.1 ft/s to 20 ft/s. Provide ±1.0% accuracy of reading between 2 and 20 ft/second flow

velocity. No greater than 0.1 psi pressure drop at 12 ft/s flow velocity. Onicon F-3500 or equal.

2.11.8 Airflow Measuring Stations: Provide airflow measuring station consisting of multiple hermetically sealed bead in glass thermistor probes capable of reading airflow with an accuracy of ±2% of reading. Ebron GTx116-p+ or engineer approved equal.

2.11.9 Humidity Sensors: Relative-humidity sensing element shall use non-saturating sensing elements capable of withstanding a saturated condition without permanently affecting calibration or sustaining damage. Sensing elements shall have an accuracy of plus or minus 5 percent of full scale within the range of 20 to 80 percent relative humidity. A 2-wire, loop-powered transmitter located at the sensing elements shall be provided to convert the sensing elements output to a linear 4-to-20 mAdc output corresponding to the required humidity measurement. The transmitter shall be a 2-wire, loop-powered device. The output error shall not exceed 0.1 percent of calibrated measurement. The transmitter shall include offset and span adjustments.

2.12 Guarantee:

2.12.1 All components, parts, and assemblies shall be guaranteed against defects in material and workmanship for a period of one year after acceptance. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations. Guarantee commences at time of acceptance and continues for one year. Acceptance shall not occur until the Owner's operators are able to use the EMCS/DDC and receive reliable information from inputs and outputs.

2.12.2 The first year guarantee shall, as part of the base bid for the EMCS/DDC, include full service and maintenance of the EMCS/DDC. This service and maintenance shall include all necessary repair, reprogramming, calibration, cleaning, minimum (4) quarterly inspections, call back service, etc. This first year service, maintenance and guarantee shall be included in the base bid of the EMCS/DDC.

3 EXECUTION

3.1 Examine areas and conditions under which EMCS/DDC work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 Installation of EMCS/DDC:

3.2.1 General: Install systems and materials in accordance with manufacturer's instructions, shop drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division-26 sections of these specifications. Mount panels at convenient locations and heights.

3.2.2 Control Wiring: The term "control wiring" is defined to include wire, conduit and miscellaneous materials as required for mounting and connecting electric control devices. Install all control wiring in conduit. All low voltage control wiring shall be installed in conduit.

3.2.3 Wiring System: Install complete control wiring system for the EMCS/DDC. Conceal wiring, except in mechanical rooms and areas where other conduit and piping are exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

3.2.4 Install control wiring in accordance with the National Electric Code and Division 26 requirements.

3.2.5 Number-code or color-code conductors, excluding those used for local individual room controls, appropriately for future identification and servicing of control system. Tag all sensor wiring to identify zone number and room number where sensor is located.

3.2.6 Label all sensors, valves, dampers, safety devices and controllers with engraved tags matching the shop drawings.

3.3 Programming of EMCS/DDC:

3.3.1 The Contractor shall obtain operational schedules for the controlled equipment from the Engineer. Submittal data relevant to operational schedules shall be forwarded from the Contractor to the Engineer. Upon receipt of approval, the Contractor shall proceed with installation, setup, calibration and check out of the various control and monitoring systems.

Having completed component and system installation, the Contractor shall submit a written request to the Engineer to inspect and approve their satisfactory operation.

3.3.2 The EMCS/DDC shall perform all functions on the equipment as describes in Division-23 section “HVAC Sequence of Operation and as called for in the input/output schedule on the drawings. This, in conjunction with the drawings, defines the scope and extent of the project with regard to the required number of panels, control point relays, and devices. Field verify voltages at point-of-interface and provide relays as required.

3.3.3 Channel numbers may be reassigned by the Contractor during shop drawing submittal.

3.3.4 Model numbers, horsepowers, voltages, and other information equipment where listed on the drawings are for Contractor's convenience. Verify all information in the field as necessary for preparation of shop drawings.

3.4 Functional Requirements of EMCS/DDC:

3.4.1 Provide all necessary relays, sensors, wiring and contacts to achieve proper operation.

3.4.2 Connect EMCS/DDC panels to remote panels where shown.

3.4.3 Coordinate EMCS/DDC work with pneumatic control work. Provide compatible equipment.

3.5 Adjusting and Cleaning:

3.5.1 Startup: Startup, test, and adjust the EMCS/DDC in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

3.5.2 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.5.3 Final Adjustment: After completion of installation, adjust the program, relays, interface devices, and similar equipment provided as work of this section for optimum operation.

3.6 VFD System Adjustment: The drive/controller supplier shall set all adjustments and setpoints for initial operation. The hydronic system and all pumps and control valves shall be monitored for proper operation. The ductwork and all fans and terminal units shall be monitored for proper operation . It shall be recognized that final settings will be obtained by trial-and-error by necessity. Call backs to achieve proper settings shall be included in the base bid.

3.7 Owner's Instructions:

3.7.1 During system startup and at such time acceptable performance of the EMCS/DDC hardware and software has been established, the Contractor shall provide on-site operator instruction. This instruction shall be performed during normal working hours and shall be conducted by a competent representative of the Contractor familiar with the system's software, hardware and accessories. The Contractor shall maintain a roster of all attendees at all training sessions.

3.7.2 At a time mutually agreed upon during system training as stated above, the Contractor shall give up to 40 hours (as needed) of instruction to the Owner's designated personnel on the operation of all equipment within the EMCS/DDC and describe its intended use with respect to the programmed functions specified.

3.7.3 Operator orientation of the EMCS/DDC shall include, but not be limited to, the overall operational program, equipment functions both individually and as part of the total integrated system, commands, advisories, and appropriate operator intervention required in responding to the EMCS/DDC operation.

3.7.4 Provide at least 14-day notice to Owner and Engineer of training dates.

3.8 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the EMCS/DDC system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

END OF SECTION 230923

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SECTION 23 21 13
HEATING HOT WATER AND CHILLED WATER SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Refer to other Division-23 sections for insulation of hydronic piping; not work of this section.

1.4 Refer to other Division-23 sections for hydronic specialties; not work of this section.

1.5 Refer to other Division-23 sections for HVAC pumps, chillers, and boilers; not work of this section.

1.6 Refer to other Division-23 sections for testing, adjusting, and balancing of hydronic piping systems; not work of this section.

1.7 Codes and Standards: Fabricate and install hydronic piping in accordance with ASME B31.9 "Building Services Piping."

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's product data for:

Valves
Meters and Gauges
Vibration Control
Access doors

1.8.2 Shop Drawings: Submit scaled layout drawings of piping systems in mechanical rooms including, but not necessarily limited to, pipe sizes, location, offsets, connections, elevations, and hydronic specialties. Indicate interface and spatial relationship between piping and equipment. Coordinate with all other trades work and existing conditions. Field verify final location of pipe prior to submittal of layout drawings and fabrication.

1.9 Test Reports and Verification Submittals:

Submit welder's certificates.
Submit water treatment test report.

1.10 O&M Manual Submittals: Submit a copy of approval submittals. Include this data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ASME B31.9 Code for Building Services Piping where applicable, base pressure rating on hydronic piping systems maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in hydronic piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.2 Basic Identification: Provide identification complying with Division-23 Basic Mechanical Materials and Methods section "Mechanical Identification."

2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; Class 125 cast-iron fittings with threaded joints.

2.3.2 Tube Size 2" and Smaller: Copper tube; Type L, hard-drawn temper; wrought-copper fittings with soldered joints.

2.3.3 Pipe Size 2½" and Larger: Black steel pipe; Schedule 40; wrought-steel buttwelding fittings with welded joints.

2.3.4 Underground Piping: All underground piping regardless of size shall be welded.

2.4 Basic Piping Specialties: Provide piping specialties complying with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties."

2.5 Basic Supports and Anchors: Provide supports and anchors complying with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors."

2.6 Basic Valves: Provide valves complying with Division-23 Basic Materials and Methods section “Valves” and the following list:

2.6.1 Standard Service Sectional Valves: Type GA1, GA3, BF1, BF2, BF3, BF4.

2.6.2 Standard Service Shutoff Valves: Type GA1, GA3, BA1, BF2, BF4.

2.6.3 Standard Service Check Valves: Type CK1, CK3.

2.6.4 Standard Service Drain Valves: Type GA1, BA1.

2.6.5 Standard Service Terminal Runout Valves (Steel Runouts): Type GA1, GA3, BA1.

2.6.6 Standard Service Terminal Runout Valves (Copper Runouts): Type GA2, BA2.

2.7 Basic Meters and Gauges: Provide meters and gauges complying with Division-23

Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

2.7.1 Temperature gauges and fittings.

2.7.2 Pressure gauges and fittings.

2.7.3 Flow measuring meters.

2.8 Basic Vibration Control: Provide vibration control products complying with Division-23 Basic Mechanical Materials and Methods section “Vibration Control” and the following list:

2.8.1 Pump Connections: Type PF1.

2.8.2 Chiller Connections: Type PF2.

2.9 Access Doors: Provide access doors to service all valves and other devices as required in accordance with Division-23 Basic Materials and Methods Section “Access Doors”.

3 EXECUTION

3.1 General: Examine areas and conditions under which hydronic piping systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Hydronic Piping:

3.2.1 General: Install hydronic piping in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.2.2 Install eccentric reducers where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush. Do not use bushings.

3.2.3 Install piping with 1/32" per foot (¼%) upward slope in direction of flow, or as indicated on the drawings. The intent is to install piping sloped to drains at low points in the system for a drainable system.

3.2.4 Connect branch-feed piping to mains at horizontal center line of mains, connect run-out piping to branches at horizontal center line of branches.

3.2.5 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.3 Install piping specialties in accordance with Division-23 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors in accordance with Division-23 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Install valves in accordance with Division-23 Basic Mechanical Materials and Methods section "Valves".

3.5.1 Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves 2 or more hydronic terminals or equipment connections, and elsewhere as indicated.

3.5.2 Shutoff Valves: Install on inlet and outlet of each mechanical equipment item, and on inlet and outlet of each hydronic terminal, and elsewhere as indicated.

3.5.3 Drain Valves: Install on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain hydronic piping system.

3.5.4 Check Valves: Install on discharge side of each pump, and elsewhere as indicated.

3.6 Install meters and gauges in accordance with Division-23 Basic Materials and Methods section "Meters and Gauges".

3.7 Equipment Connections:

3.7.1 General: Connect hydronic piping system to mechanical equipment as indicated on the drawings, and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return and a drain valve on the drain connection. Connections between dissimilar metals shall be made with dielectric devices.

3.7.2 Hydronic Terminals: Install hydronic terminals with shutoff valves, unions and related devices as shown on the drawings. Install manual air vent valve on element in accordance with manufacturer's instructions. Locate valves and balancing cocks for ease of maintenance. Where indicated, install automatic temperature control valve with unions on return line between coil and shutoff valve.

3.8 Provide sufficient swing joints, expansion loops and devices necessary for a flexible piping system. Install drain valves at all low points of each system to enable complete drainage, and air vents at all high points in the piping system to enable complete air venting.

3.9 Pipe drains from pump glands, relief valves, strainers, etc., to spill over an open sight drain, floor drain or other acceptable discharge point, and terminate with a plain end (unthreaded pipe) 6" above the drain. Rigidly support all drains.

3.10 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-23 Basic Mechanical Materials and Methods section “Access Doors”.

3.11 Testing, Cleaning, Flushing, and Inspecting: Test, clean, flush, and inspect hydronic piping systems in accordance with requirements of Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems."

3.12 Chemical Treatment: Fill l hydronic piping systems, adding a nitriteborate, MBT based treatment for corrosion protection. Add to establish the levels recommended by the water treatment company, but no less than 500 ppm nitrite and a minimum pH of 8.5. Repeat measurements daily with system under full circulation and apply chemicals to adjust levels until no change is apparent. The contractor shall maintain the chemical treatment throughout construction and the warranty period.

END OF SECTION 232113

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SECTION 23 21 14
HEATING HOT WATER AND CHILLED WATER PREINSULATED PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of underground preinsulated piping system work, is indicated on drawings and by requirements of this section.

1.4 Verify all existing conditions prior to bidding. The Contractor shall include in his price for the underground preinsulated system sufficient elbows, offsets, and pipe to provide for unforeseen conditions. The drawings do not show the exact location or inverts of all existing utilities, conditions, etc. However, the contractor's bid shall include sufficient labor and material costs to allow for these conditions without causing additional cost for the Owner or delays in the project schedule.

1.5 Refer to other Division-23 sections for field-applied insulation, manholes, valves, hydronic specialties, and expansion compensation.

1.6 Codes and Standards: Fabricate and install piping in accordance with ASME B31.9 "Building Services Piping".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for systems, including: carrier pipe, jacket, insulation, materials and products.

1.7.2 Shop Drawings: Submit scaled layout drawings of underground preinsulated piping system including, but not necessarily limited to, pipe sizes, location, offsets, connections, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Indicate interface and spatial relationship between piping and manholes. Coordinate with all other site utilities and all existing conditions. Field verify final location of pipe prior to submittal of layout drawings and fabrication. Shop drawings shall indicate the existing conditions. Probe or excavate as required.

1.8 O&M Data Submittals: Submit a copy of approval submittals for jacket and piping materials and products. Include this data in O&M manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated preinsulated piping and insulation products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by manufacturer to

comply with installation requirements. Provide materials and products complying with ASME B31.9 Code for Building Services Piping where applicable, base pressure rating on piping systems maximum design pressures. Provide fittings and materials which match pipe materials used in piping systems.

2.2 Carrier Pipe and Fittings: Provide pipes and pipe fittings complying with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

2.2.1 Chilled Water Piping: A-53 black steel pipe, Grade B; Schedule 40; ERW, wrought-steel buttwelding fittings, welded joints.

2.2.2 Heating Hot Water Piping: A-53 black steel pipe, Grade B; Schedule 40; ERW, wrought-steel buttwelding fittings, welded joints.

2.3 Outer Jacket:

2.3.1 Jacket: The outer casing shall be high density polyethylene (HDPE) conforming to ASTM D1248 and D3350, Type III, Category 5, Class C and Grade P23/P24. With a minimum of 2% by weight of carbon black. Minimum thickness is 150 mils.

2.3.2 Provide straight lengths of pre-insulated pipe and fittings for field installation. Jackets for fittings shall be of the same construction as the jacket material.

2.3.3 End Seals: Seal each length of pre-insulated pipe with a watertight mastic end seal at the jacket and pipe surfaces. Any field cuts shall be sealed with a field applied end seal per the manufacturer’s standard practice.

2.3.4 Anchors: Provide prefabricated 1/2" plate steel anchors attached to the carrier pipe and sealed to the pipe jacketing per manufacturer’s standard practice.

2.3.5 Pipe Support Guides: Provide standard manufacturer's full round guides.

2.4 Insulation:

2.4.1 Chilled Water Pipe Insulation: polyurethane foam with minimum K = 0.16 and a density of 2 lb/ft^3: smaller than 6" pipe -1½" thick, 6" and larger pipe -2" thick

2.4.2 Heating Hot Water Pipe Insulation: polyurethane foam with minimum K = 0.16 and a density of 2 lb/ft^3: smaller than 6" pipe -1½" thick, 6" and larger pipe -2" thick

2.4.3 Insulation shall be complete through all piping, expansion loops and fittings.

2.5 Acceptable Manufacturers: Subject to compliance with requirements, provide preinsulated piping systems of one of the following: Ricwil, Rovanco, Perma Pipe, Thermacor, Energy Taskforce.

3 EXECUTION

3.1 Inspection: Examine areas and conditions under which products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Underground Piping: Install in accordance with Division-23 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings" and "Excavation and Backfill".

3.2.1 Expansion loops and ells: Provide sufficient loops for a flexible piping system in accordance with ASME Code for pressure piping and the manufacturer's standard practice.

3.2.2 Anchors: Provide anchors where shown on the plans or as determined by the manufacturer's recommendations.

3.2.3 End seals: Terminate ends of pre-insulated pipe inside building walls and manholes with end seals.

3.2.4 After welding and pressure testing, all joints shall be insulated and sealed in accordance with the manufacturer's published methods.

3.3 Testing: Carrier pipe shall be pressure tested hydrostatically in accordance with Division-23 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems" after welding and prior to closure of jacket. All jacket closures shall be field tested with air before backfilling. The Contractor shall provide all necessary equipment for the testing.

END OF SECTION 232114

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SECTION 23 21 16
HYDRONIC SPECIALTIES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Refer to other Division-23 sections for insulation of hydronic specialties; not work of this section.

1.4 Codes and Standards:

1.4.1 ASME Compliance: Manufacture and install hydronic specialties in accordance with ASME B31.9 "Building Services Piping".

1.5 Approval Submittals:

1.5.1 Product Data: Submit manufacturer's technical product data and installation instructions for each type of hydronic specialty. Include pressure drop curve or chart for each type and size of hydronic specialty. Submit schedule indicating manufacturer's figure number, size, location, rated capacities, and features for each required hydronic specialty.

Balancing Cocks
Vent Valves
Air Separators
Diaphragm Type Compression Tanks
Shot Feeders
Liquid Flow Switches
Water Relief Valves
Pressure-Reducing Valves
Pump Suction Diffusers
Flow Control Valves
Differential Pressure Relief Valves

1.6 O&M Data Submittals:

1.6.1 Maintenance Data: Submit a copy of approval submittals. Submit maintenance data and spare parts lists for liquid flow switches, pressure-reducing valves, pump differential relief valves . Include these data in the O&M manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated hydronic specialties recommended by manufacturer for use in service indicated. Provide hydronic specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper

selection as determined by Installer 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 but more than one type cannot be used on project.

2.2 Vent Valves:

2.2.1 Manual Vent Valves: Provide ball valves with copper goose-necks for use as manual vent valves.

2.2.2 Automatic Vent Valves: Provide automatic vent valves designed to vent automatically with float principle, stainless steel float and mechanisms, brass cast iron body, pressure rated for 150 psi, ¾" NPS inlet connection. Hoffman No. 792. Use for central plant equipment.

2.2.3 Automatic Vent Valves: Provide automatic vent valves designed to vent automatically with float principle, stamped brass body, pressure rated for 150 psi, ½" NPS inlet connection. Bell & Gossett No. 87. Use for all distribution piping.

2.2.4 Acceptable Manufacturers: Subject to compliance with requirements, provide vent valves of one of the following:

Crane
Bell & Gossett
Hoffman
NuTech
Sarco
Wheatley
Taco, Inc.

2.3 Air Separators: Provide air separators pressure rated for 125 psi. Select capacity based on total system gpm.

2.3.1 In-Line Air Separators: Provide in-line air separators with tangential nozzles and stainless steel air collector tube as indicated. Construct sizes 1½" and smaller of cast iron; and sizes 2" and larger of steel complying with ASME Boiler and Pressure Vessel Code and stamped with "U" symbol. Furnish National Board Form U-1 denoting compliance.

2.3.2 Acceptable Manufacturers: Subject to compliance with requirements, provide air separators of one of the following:

Amtrol, Inc.
Bell & Gossett
Flo-Fab
John Wood Co.
Wheatley
Taco, Inc.

2.4 Diaphragm-Type Compression Tanks: Provide diaphragm compression tanks of size and number as indicated. Construct tank of welded steel, constructed, tested, and

stamped in accordance with Section VIII of ASME Boiler and Pressure Vessel Code for a working pressure of 125 psi. Furnish National Board Form U-1 denoting compliance. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity. Provide pressure gauge and air-charging fitting, and drain fitting.

2.4.1 Acceptable Manufacturers: Subject to compliance with requirements, provide diaphragm-type compression tanks of one of the following:

Amtrol, Inc.
Bell & Gossett
Flo-Fab
Taco, Inc.
Wheatley

2.5 Shot Feeders: Provide shot feeders of 5 gallon capacity or otherwise as indicated, construction of cast iron or steel, for introducing chemicals in hydronic system. Provide 3-1/2" screwed on top with o ring seal for loading, drain valve in bottom, and recirculating valves on side. Construct for pressure rating of 125 psi.

2.6 Liquid Flow Switches: Provide liquid flow switches as indicated to sense flow and non-flow. Construct of brass for all wetted parts, provide packless construction. Provide paddle with removable segments for pipe size and flow velocity. Provide vapor proof electrical compartment for switches mounted on cold hydronic piping systems. Coordinate switch electrical requirements with chiller and HVAC control requirements. McDonald & Miller or equal.

2.7 Water Relief Valves: Provide water relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

2.7.1 Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 Listing Requirements for temperature discharge capacity. Provide temperature relief at 210ºF and pressure relief at 125 psi.

2.7.2 Pressure Relief Valves: Provide ASME pressure relief valves, bronze or iron body as required with test. The set point shall be at or below the maximum allowable working pressure of the most limiting device in the system being protected. Valves shall have enclosed spindles with gland seals to minimize leakage. Coordinate pressure relief setting to protect all equipment.

2.7.3 Acceptable Manufacturers: Subject to compliance with requirements, provide water relief valves of one of the following:

Amtrol, Inc.
Bell & Gossett
Watts Regulator Co.
McDonald & Miller
Kunkle

Manning, Maxwell & Moore
Wheatley

2.8 Pressure Reducing Valves: Provide pressure reducing valves as indicated, of size and capacity as selected by Installer to maintain operating pressure on boiler system.

2.8.1 Construction: Cast iron or brass body, low inlet pressure check valve, inlet strainer removable without system shut-down, noncorrosive valve seat and stem, factory set at operating pressure.

2.8.2 Acceptable Manufacturers: Subject to compliance with requirements, provide pressure reducing valves of one of the following:

Amtrol, Inc.
Bell & Gossett
Taco, Inc.
Watts Regulator Co.
Wheatley

2.9 Pump Suction Diffusers: Provide pump suction diffusers as indicated. Construct unit with angle pattern cast-iron body, threaded for 2" and smaller, flanged for 2½" and larger, pressure rated for 175 psi. Provide inlet vanes with length 2½ times pump suction diameter or greater. Provide cylinder strainer with 3/16" diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head. Provide disposable fine mesh strainer to fit over cylinder strainer. Provide permanent magnet located in flow stream, removable for cleaning. Provide adjustable foot support designed to carry weight of suction piping. Provide blowdown tapping in bottom, gauge tapping in side.

2.9.1 Acceptable Manufacturers: Subject to compliance with requirements, provide pump suction diffusers of one of the following:

Amtrol, Inc.
Bell & Gossett
Flo-Fab
Taco, Inc.
Wheatley

3 EXECUTION

3.1 General: Examine areas and conditions under which hydronic specialties are to be installed. Do not proceed with work until satisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Vent Valves:

3.2.1 Manual Vent Valves: Install manual vent valves on each hydronic terminal at highest point, and on each hydronic piping drop in direction of flow for mains, branches, and runouts, and elsewhere as indicated.

3.2.2 Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser and elsewhere as indicated. Install shut-off valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.

3.3 Air Separators:

3.3.1 In-Line Air Separators: Install in-line air separators in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank with ¼" per foot (2%) upward slope towards tank. Install drain valve on units 2" and over.

3.4 Diaphragm-Type Compression Tanks: Install diaphragm-type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.

3.5 Shot Feeders: Install shot feeders on each hydronic system at pump discharge and elsewhere as indicated. Install in upright position with top of funnel not more than 48" above floor. Install globe valve in pump discharge line between recirculating lines. Pipe drain to nearest plumbing drain or as indicated.

3.6 Liquid Flow Switches: Install liquid flow switches on inlet to water chiller inlet to water condenser and elsewhere as indicated. Install in horizontal pipe with switch mounted in tee on top of pipe with minimum of 24" of straight pipe with no fittings both upstream and downstream of switch. Remove segments of paddle to fit pipe in accordance with manufacturer's instructions.

3.7 Water Relief Valves: Install where indicated on the drawings. Pipe discharge to drain. Rigidly support discharge piping and route in the most direct manner possible. Turn down relief piping so as not to injure personnel. Comply with ASME Boiler and Pressure Vessel Code.

3.7.1 Pipe discharge from relief valve full size, sloping downward to a floor drain or outside the building. Cut the end of the pipe at a 45º angle and terminate the pipe six inches above the floor or grade.

3.8 Pressure Reducing Valves: Install for each piece of hydronic equipment requiring makeup water in accordance with manufacturer's installation instructions.

3.9 Pump Suction Diffusers: Install pump suction diffusers on each pump suction line in lieu of separate strainer, reducing elbow, entrance pipe, and pressure gauge outlet. Install on pump suction inlet, adjust foot support to carry weight of suction piping. Install nipple and shutoff valve in blowdown connection. After cleaning and flushing hydronic piping system, but before balancing of hydronic piping system, remove disposable fine mesh strainer.

END OF SECTION 232116

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SECTION 23 21 23
HVAC PUMPS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of HVAC pumps work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.4 Pumps furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division-23 sections.

1.5 Refer to Division-26 sections for the following work; not work of this section.

1.5.1 Power supply wiring from power source to power connection on pumps. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.5.2 Interlock wiring between pumps; and between pumps and field-installed control devices.

1.6 Codes and Standards: UL and NEMA Compliance: Provide electric motors and components which are listed and labeled by Underwriters Laboratories and comply with NEMA standards.

1.7 Submittals:

1.7.1 Product Data: Submit manufacturer's pump specifications, installation and start-up instructions, and current accurate pump characteristic performance curves with selection points clearly indicated.

1.7.2 Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

1.7.3 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to HVAC pumps. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

1.7.4 Maintenance Data: Submit maintenance data and parts lists for each type of pump, control, and accessory; including "trouble-shooting" maintenance guide. Include these data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

1.8 Manufacturer: Subject to compliance with requirements, provide pumps of one of the following:

Aurora
Bell and Gossett
Flo-Fab
Taco
Patterson

2 PRODUCTS

2.1 General: Provide factory-tested pumps, thoroughly cleaned, and painted with one coat of machinery enamel prior to shipment. Type, size, and capacity of each pump is listed in pump schedule. Provide pumps of same type by same manufacturer. Select pumps to be non-overloading over full range of curve.

2.2 Close-Coupled End Suction Pumps:

2.2.1 General: Provide close-coupled end suction pumps where indicated, and of capacities and having characteristics as scheduled.

2.2.2 Type: Horizontal mount, single stage, vertical split case, designed for 175 psi working pressure.

2.2.3 Casing: Cast iron, bronze fitted, 125 psi ANSI flanges, tappings for gauge and drain connections.

2.2.4 Shaft: Steel with replaceable shaft sleeve.

2.2.5 Seal: Mechanical, with carbon seal ring and ceramic seat.

2.2.6 Motor: Non-overloading at any point on pump curve, open, drip-proof, with regreasable ball bearings, high efficiency as per Division 23, Basic Materials and Methods section, "Motors".

2.2.7 Impeller: Bronze, enclosed type, hydraulically and dynamically balanced, keyed to shaft and secured with locking screw.

3 EXECUTION

3.1 Examine areas and conditions under which HVAC pumps are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Pumps: Install HVAC pumps where indicated, in accordance with manufacturer's published installation instructions, complying with recognized industry practices to ensure that HVAC pumps comply with requirements and serve intended purposes.

3.3 Access: Provide access space around HVAC pumps for service as indicated, but in no case less than that recommended by manufacturer.

3.4 Support: Install pumps on minimum of 4" high concrete inertia base equal or greater than 3 times total weight of pump and motor, and anchor bolts poured in place. Set and level pump, grout under pump base with non-shrink grout. Refer to Division-23 section "Vibration Isolation" for support and mounting requirements of HVAC pumps.

3.5 Piping Connections: Refer to Division-23 HVAC piping sections. Provide piping, valves, accessories, gages, supports, and flexible connections as indicated. Provide 10 gage black steel drip pan under chilled water pumps with 3/4" drain line to floor drain.

3.6 Alignment: Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer with the use of laser alignment tools, and in presence of manufacturer's service representative. Align pumps prior to grouting bases. Provide report confirming alignment.

3.7 Start-Up: Lubricate pumps before start-up. Start-up in accordance with manufacturer's instructions.

3.8 Refer to Division-23 section "HVAC Test-Adjust-Balance" for pump system balancing; not work of this section.

3.9 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 232123

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SECTION 23 31 13
HVAC METAL DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for exterior insulation of metal ductwork.

1.5 Refer to other Division-23 sections for ductwork accessories.

1.6 Codes and Standards:

1.6.1 SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" 1985 Edition for fabrication and installation of metal ductwork, unless otherwise noted.

1.6.2 NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6.3 NFPA 96 Compliance: Comply with NFPA 96 "Standard for Installation of Equipment for Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for the following.

Factory-fabricated ductwork
Sealants
Duct liner
Adhesive
Flexible duct
Spin-in fittings
Side take-off fittings
Fabric Ductwork

1.7.2 Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those

modifications ensure that free area, materials, and rigidity are not reduced.

2 PRODUCTS

2.1 Ductwork Materials:

2.1.1 Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

2.1.2 Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.2 Miscellaneous Ductwork Materials:

2.2.1 General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

2.2.2 Duct Liner: Fibrous glass, 1½ pcf minimum density, complying with Thermal Insulation Manufacturers Association (TIMA) AHC-101; of thickness indicated. Certainteed "Coated Ultralite", Owens Corning "Aeroflex", PPG "Textrafine", or Manville "Linacoustic".

2.2.3 Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".

2.2.4 Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

2.2.5 Duct Sealant: Provide non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

2.2.6 Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork. For exposed stainless steel ductwork, provide matching stainless steel support materials.

2.2.7 Flexible Ducts: Provide flexible ductwork with an R-value of R-6unless the ductwork is in a ceiling return plenum. The use of flexible ductwork for connection of supply air including terminal units and return air devices is acceptable only where shown on the drawings.

2.2.7.1 Construction: Provide reinforced metalized polyester jacket that is tear and puncture

resistant, air tight inner core with no fiberglass erosion in the air stream and an encapsulated wire helix. Flexible ductwork shall have a recommended operating pressure of 6" w.g. for sizes 4" through 12" diameter and 4" w.g. for sizes 14" through 20" diameter. All diameters shall be suitable for a negative operating pressure of 0.75" w.g. Flexible ductwork shall meet the requirements of UL-181, the Florida Energy Code, Florida Building Code, NFPA 90A and NFPA 90B.

2.2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide R-6 flexible ductwork by: Atco 36, Flexmaster 8M-R6 or Thermaflex M-KE R6.

2.2.8 Spin-in and Side Take-off Fittings: Provide round branch run-outs as follows.

2.2.8.1 Spin in air device connections shall be straight sided spin in with damper and two inch high insulation stand-off equal to Crown 3720-DS.

2.2.8.2 Where duct height does not permit the use of spin-in fittings, use low profile side take-off fittings equal to Crown 3300-DS or Flexmaster STOD-BO.

2.2.9 Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15° change of direction per section. Unless specifically detailed otherwise, use 45° laterals and 45° elbows for branch takeoff connections. Where 90° branches are indicated, provide conical type tees.

2.3 Fabrication:

2.3.1 Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

2.3.2 Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards", except provide sealant at all joints. Supply duct between AHU discharge and terminal units shall be minimum 4" pressure class. Duct downstream of terminal units, supply duct from low pressure air conditioning units, and all return and exhaust duct shall be minimum 2" pressure class unless otherwise noted.

2.3.3 Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1½ times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.

2.3.4 Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-23 section "Ductwork Accessories" for accessory requirements.

2.3.5 Fabricate duct plenums with duct liner where indicated. Laminate liner to internal surfaces of duct (100% coverage) in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners (Grip Nails or Stic Klips) on

16 centers. On horizontal runs install top and bottom first and wedge sides between top and bottom. Apply a brush coat of fire retardant over all joints, visible cut edges, and leading edges to prevent erosion.

2.4 Factory-Fabricated Low Pressure Ductwork (Maximum 2" W.G.):

2.4.1 Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.

2.4.2 Gauge: 28-gauge minimum for round ducts and fittings, 4" through 8" diameter. 26-gauge minimum 9" through 14", 24-gauge minimum 15" through 26".

2.4.3 Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.

2.4.4 Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.

2.4.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork by Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp, or approved equal.

2.5 Factory-Fabricated High Pressure Ductwork (3" W.G. and Higher):

2.5.1 Round Ductwork: Construct of galvanized sheet steel complying with ASTM A 527 by the following methods and in minimum gauges listed.

Diameter	Minimum Gauge	Method of Manufacture
3" to 14"	26	Spiral Lockseam
15" to 26"	24	Spiral Lockseam
27" to 36"	22	Spiral Lockseam
37" to 50"	20	Spiral Lockseam
51" to 60"	18	Spiral Lockseam
Over 60"	16	Longitudinal Seam

Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams.

Diameter	Minimum Gauge
3" to 36"	20
38" to 50"	18
Over 50"	16

2.5.2 Flat-Oval Ductwork: Construct of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, in minimum gauges listed.

Maximum Width	Minimum Gauge
Under 25"	24
25" to 48"	22
49" to 70"	20
Over 70"	18

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams.

Maximum Width	Minimum Gauge
Under 37"	20
37" to 50"	18
Over 50"	16

2.5.3 Internally Insulated Duct and Fittings: Construct with outer pressure shell, 2" thick insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, use longitudinal seam for over 59", in minimum gauges listed.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 12"	26 ga.	24 ga.
13" to 24"	24 ga.	24 ga.
25" to 34"	22 ga.	24 ga.
35" to 48"	20 ga.	24 ga.
49" to 58"	18 ga.	24 ga.
Over 59"	16 ga.	20 ga.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 34"	20 ga.	20 ga.
36" to 48"	18 ga.	20 ga.
Over 48"	16 ga.	20 ga.

Inner Liner for Straight Duct: Perforate with 3/32" holes for 22% open area. Provide metal spacers welded in position to maintain spacing and concentricity. Provide a plastic film between the perforated liner and insulation to act as a vapor barrier.

Inner Liner for Fittings: Solid sheet metal. Provide metal spacers welded in position to maintain spacing and concentricity.

2.5.4 Optional Ducts and Fittings: At Installer's option, provided that certified tests by Manufacturer show that rigidity and performance is equivalent to SMACNA standard gauge ductwork, provide ducts and fittings as follows:

Ducts: Construct of Manufacturer's standard gauge, with spiral lock seam and

intermediate standing rib.

Fittings: Construct by fabricating with spot welding and bonding with neoprene-base cement in lieu of continuous weld seams.

2.5.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp., or approved equal.

3 EXECUTION

3.1 General: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Metal Ductwork:

3.2.1 General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor.

3.2.2 Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.

3.2.3 Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding. High velocity rectangular ducts shall have approved joints and be made airtight with sealer or welding.

3.2.4 Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to ½" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

3.2.5 Internally Lined Ductwork: Cover leading and trailing edge of duct liner with sheet metal nosing zee.

3.2.6 Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other electrical equipment spaces and enclosures.

3.2.7 Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1½". Fasten to duct and substrate. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.

3.2.8 Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

3.2.9 Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.

3.3 Installation of Flexible Ducts:

3.3.1 Maximum Length: For any duct run using flexible ductwork, do not exceed 5'-0" extended length. Flexible duct shall only be allowed as detailed on the drawings.

3.3.2 Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible". Support flexible ducts to eliminate pinching and kinking which would restrict flow.

3.3.3 Downstream of VAV Boxes: Peel back insulation and slide the inner core over the spin-in or diffuser neck, seal with duct sealant and install Panduit strap tightly. Slide insulation back over the inner core and install another Panduit strap over the insulation outer jacket. Tape is not acceptable.

3.3.4 Upstream of VAV Boxes: Install same as downstream, except use stainless steel worm-gear clamps instead of Panduit straps.

3.3.5 Seal all exposed edges of fiberglass insulation with glassfab and mastic.

3.4 Leakage Tests: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Test pressure shall be equal to pressure class of duct, less 0.5" static pressure. Repair leaks and repeat tests until total leakage is less than 5% of system design air flow for low pressure systems and less than 1% for systems rated over 3".

3.5 Equipment Connections: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.6 Clean ductwork internally free of dust and debris. Clean external surfaces of foreign

substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.

3.7 Balancing: Refer to Division-23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

3.8 System Adjustment: Adjust the system to provide functional operation to the extent possible, and leave ready for Testing and Balancing work. It is not the intent of this section to provide final testing and balancing, but to leave the system operational with a minimum of noise.

END OF SECTION 233113

SECTION 23 33 00
DUCTWORK ACCESSORIES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.5 Codes and Standards:

1.5.1 SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" and "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems".

1.5.2 UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers". Construct, test and label smoke dampers in accordance with UL Standard 555S "Leakage Rated Dampers for use in Smoke Control Systems" .

1.5.3 NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:

Low pressure manual dampers
Control dampers
Fire dampers
Smoke dampers
Duct access doors
Flexible connections

1.6.2 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists for fire dampers, smoke dampers. Include this data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Dampers:

2.1.1 Low Pressure Manual Dampers: Provide 16 gauge dampers of single-blade type (12" maximum blade width) or multiblade type. Damper blades to be gang-operated from a single shaft with nylon or ball bearings on each end. Provide indexed locking quadrant. Parallel or opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct.

2.1.2 Control Dampers: Extruded aluminum (6063-T5) damper frame shall not be less than 0.080” in thickness. Damper frame shall be 4” deep x 1", with duct mounting flanges on both sides of frame. Damper frame shall have a 2" mounting flange on the rear of the damper when installed as Extended Rear Flange install type. Aluminum frame shall be clear anodized to a minimum thickness of 0.7 mil deep. Frame shall be assembled using stainless steel screws. Welded frames shall not be acceptable. Actuators (motors) are provided by control contractor.

2.1.2.1 Blades shall be maximum 6.4” deep extruded aluminum (6063-T5) air-foil profiles with a minimum wall thickness of 0.06”, clear anodized to a minimum thickness of 0.7 mil deep.

2.1.2.2 Blade seals shall be extruded silicone, secured in an integral slot within the aluminum blade extrusions and shall be mechanically fastened to prevent shrinkage and movement over the life of the damper. Adhesive or clip-on type blade seals will not be approved.

2.1.2.3 Hexagonal control shaft shall be $^{7}/_{16}$". It shall have an adjustable length and shall be an integral part of the blade axle. A field-applied control shaft shall not be acceptable. All parts shall be stainless steel.

2.1.2.4 Linkage hardware shall be aluminum and stainless steel, installed in the frame side, out of the airstream, and accessible after installation. Linkage hardware shall be complete with stainless steel cup-point trunnion screws to prevent linkage slippage. Linkage that consists of metal rubbing metal will not be approved.

2.1.2.5 Dampers shall be designed for operation in temperatures ranging from -40°F to 212°F.

2.1.2.6 Dampers shall be AMCA rated for Leakage Class 1A at 1 in w.g. static pressure differential. Standard air leakage data to be certified under the AMCA Certified Ratings Program.

2.1.2.7 Dampers shall be custom made to required size, with blade stops not exceeding 1¼” in height.

2.1.2.8 Dampers shall be opposed blade for modulating dampers or parallel blade action for open/shut dampers.

2.1.2.9 Dampers shall be installed in the following manner: Installed in Duct

2.1.2.10 Installation of dampers must be in accordance with manufacturer's current installation guidelines, provided with each damper shipment.

2.1.2.11 Field supplied intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width.

2.1.2.12 Acceptable Manufacturers: Subject to compliance with requirements, provide control dampers by TAMCO (T.A. Morrison & Co, Inc), Ruskin TED50CD, Greenheck VCD33, or approved equal.

2.1.3 Acceptable Manufacturers: Subject to compliance with requirements, provide dampers by Air Balance, American Warming & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.

2.2 Fire and Smoke Dampers:

2.2.1 Fire Dampers: Provide curtain type fire dampers, UL classified and labeled per UL 555, of types and sizes indicated. Construct casings and blades of galvanized steel. Damper shall not restrict duct free area when open. Dampers shall be rated for dynamic closure under flow and pressure. Provide sleeves and mounting angles. Provide fusible link rated at 160 to 165° F unless otherwise indicated. Provide damper with positive lock in closed position. All dampers shall be spring activated. Basis of design:

1-1/2 HR: Ruskin IBD2 - Style B for rectangular, Style CR for round, Style CO for oval.

1-1/2 HR: Ruskin IBDT for transfer grilles in narrow partitions.

3 HR: Ruskin IBD23 - Style B for rectangular, Style CR for round, Style CO for oval.

2.2.2 Smoke Dampers: Provide motorized smoke dampers, UL classified under UL-555S, of types and sizes indicated. Construct frame and blades of galvanized steel. Provide sleeves. Provide damper assembly complete with electric operator that will fail safe if fire interrupts operational power. Provide for remote testing or resetting capability after response to smoke detector operation. Entire assembly shall be rated at least leakage class II (10 CFM/sq. ft. at 1" w.g. at 250ºF). Basis of design:

Systems to 1,500 FPM duct velocity or 2.5" w.g.: Class II Ruskin SD36.

Systems over 1,500 FPM duct velocity or 2.5" w.g.: Class I, airfoil blades, Ruskin SD60.

2.2.3 Acceptable Manufacturers: Subject to compliance with requirements, provide fire and smoke dampers by Air Balance, Inc., American Warning & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.

2.3 Turning Vanes: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

2.4 Duct Access Doors:

2.4.1 General: Provide duct access doors of size indicated, or as required for duty indicated.

2.4.2 Construction: Construct of same or greater gauge as ductwork served. Provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.

2.4.3 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Air Balance, Inc., Duro Dyne Corp., Ruskin Mfg. Co., or Ventfabrics, Inc.

2.5 Flexible Connections:

2.5.1 General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.5.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

3 EXECUTION

3.1 Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Ductwork Accessories:

3.2.1 Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

3.2.2 Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.

3.2.3 Install control dampers in the outside air duct and return air duct for each air handler. Damper operator provided by control contractor.

3.2.4 Install turning vanes in square or rectangular 90º elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

3.2.5 Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter. Install on entering air side of reheat coils. Install at fire dampers and smoke dampers, and

adjacent to all control dampers, airflow measuring stations, and smoke detectors. Opening size shall be per NFPA 90A for servicing fire and smoke dampers. Provide label with 1-1/2" letters to indicate location of fire protection devices—FIRE DAMPER ACCESS or SMOKE DAMPER ACCESS.

3.2.6 Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.

3.2.7 Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.2.8 Install fire dampers within fire walls and floors at locations shown on the mechanical drawings. Install in strict accordance with the manufacturer's printed instructions, NFPA 90A, and UL

3.2.9 Install smoke dampers at locations shown on the mechanical drawings. Install in strict accordance with the manufacturer's printed instructions, NFPA 90A, and UL 555S. Basis of design installation is detailed on the drawings.

3.3 Fire and Smoke Dampers: Notify Engineer at least 24 hours in advance of ceiling installation or chase closure so that complete fire and smoke damper installation can be observed. A copy of the manufacturer’s printed installation instructions shall be available at the site.

3.4 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

3.5 Adjusting and Cleaning:

3.5.1 Adjusting: Adjust ductwork accessories for proper settings. Install fusible links in fire dampers and adjust for proper action.

3.5.2 Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.

3.5.3 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.5.4 Furnish extra fusible links to Owner, one link for every 10 installed of each temperature range; obtain receipt.

END OF SECTION 233300

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SECTION 23 34 00
FANS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fan work required by this section as indicated on drawings and schedules, and by requirements of this section.

1.4 Coordination:

1.4.1 Refer to Division-23 section "Testing, Adjusting, and Balancing" for balancing of fans.

1.4.2 Refer to Division-23 HVAC control systems sections for control work required in conjunction with fans.

1.4.3 Refer to Division-26 sections for power supply wiring from power source to power connection on fans. Division-26 work will include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.5 Codes and Standards:

1.5.1 AMCA Compliance: Provide fans which have been tested and rated in accordance with AMCA standards, and bear AMCA Certified Ratings Seal.

1.5.2 UL Compliance: Provide fans which are listed by UL and have UL label affixed.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical data for fans, including specifications, capacity ratings, dimensions, weights, materials, accessories furnished, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.

Fans
Vibration Control

1.7 O&M Data Submittals: Submit maintenance data and parts list for each type of fan, accessory, and control. Include these data, a copy of approved submittals, and wiring diagrams in O&M Manual.

2 PRODUCTS

2.1 General: Except as otherwise indicated, provide standard prefabricated fans of type and size indicated, modified as necessary to comply with requirements, and as required for complete installation. Provide accessories as listed in the schedule on the drawings and as described herein. Motors shall be high efficiency per Division-23 section "Motors".

2.2 Acceptable Manufacturers: Subject to compliance with requirements provide fans manufactured by Acme, Greenheck, Loren Cook, Penn or approved equal unless otherwise noted herein.

2.3 In-Line Centrifugal Fans:

2.3.1 Housing: Provide square weather tight housing constructed of aluminum or steel and painted inside and out with an epoxy finish. Provide venturi type inlet. Provide heavy duty duct collars. Housing and bearing supports shall be constructed of heavy gauge bolted and welded steel construction. Provide two sided access panels, located perpendicular to the motor mounting plane. Provide ½" insulated housing. Provide motor and drive cover for belt drive units.

2.3.2 Fan Wheels: Provide aluminum air foil type, backward curved, statically and dynamically balanced.

2.3.3 Drive: Provide direct or belt drive as scheduled with pre-lubricated, ball bearing, continuous duty type motors. Provide vibration isolation equipment for the entire drive.

2.3.4 Filter Housing: Where indicated, provide insulated filter housing with 2-inch thick disposable MERV 8 filters. Provide construction set, a clean set installed at substantial completion, and one spare set for the owner.

2.3.5 Isolation and Support: Provide spring type vibration isolators and fan support brackets.

2.4 Vibration Isolation: Mount fans on vibration isolators in accordance with the requirements of Division-23 section "Vibration Isolation" and the following list.

2.4.1 Hangers: Type HA3.

3 EXECUTION

3.1 General: Except as otherwise indicated or specified, install fans in accordance with manufacturer's installation instructions and recognized industry practices to insure that fans serve their intended function.

3.2 Coordinate fan work with work of roofing, walls, and ceilings as necessary for proper interfacing. Framing of openings, caulking, and curb installation is not work of this section.

3.3 Ductwork: Refer to Division-23 section "Ductwork". Connect ducts to fans in accordance with manufacturer's installation instructions. Provide flexible connections

in ductwork at fans.

3.4 Install fans on vibration isolation equipment as required. Set level and plumb.

3.5 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Verify proper rotation direction of fan wheels. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.6 Remove shipping bolts and temporary supports within fans. Adjust dampers for free operation.

3.7 Testing: After installation of fans has been completed, test each fan to demonstrate proper operation of units at performance requirements specified. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

3.8 Cleaning: Clean factory-finished surfaces. Remove all tar and soil. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 233400

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SECTION 23 36 16
VARIABLE AIR VOLUME TERMINAL UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air terminals work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for external insulation of air terminals; not work of this section.

1.5 Refer to other Division-23 sections for testing, adjusting and balancing of air terminals; not work of this section.

1.6 Refer to other Division-23 sections for temperature controls which are to be furnished by others but installed as work of this section.

1.7 Refer to Division-26 sections for the following work; not work of this section. Power supply wiring from power source to power connection on air terminals. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.8 Codes and Standards:

1.8.1 ADC Compliance: Provide air terminals which have been tested and rated in accordance with ADC standards.

1.8.2 NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data, including performance data for each size and type of air terminal furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions. Submit manufacturer's assembly-type drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

Shutoff single duct VAV boxes

1.10 O&M Data Submittals:

1.10.1 Wiring Diagrams: Submit ladder-type wiring diagrams for electric power and control

components, clearly indicating required field electrical connections. Include in O&M manual.

1.10.2 Maintenance Data: Submit maintenance data and parts list for each type of air terminal; including "trouble-shooting" maintenance guide. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air terminals of one of the following (unless otherwise noted): Trane, Titus, Enviro-Tec, Price, or approved equal.

2.2 General: Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those indicated on schedule.

2.3 Shutoff Single Duct: Provide pressure independent single duct, shut-off variable volume terminal units with the following characteristics, features and accessories and as indicated on drawings and schedule.

2.3.1 Casings: The unit casing shall be minimum 22 gauge galvanized steel, internally lined with engineered polymer foam insulation which complies with UL 181 and NFPA 90A. Insulation shall be 1.5 pound density, closed cell foam. Exposed fiberglass is not acceptable. The insulation shall be mechanically fastened to the unit casing. All exposed insulation edges shall be coated with NFPA 90A approved sealant to prevent erosion. Provide air valve access panel in the casing Casing and panel shall be sealed to hold leakage to 2% of rated airflow at 3.0" w.g.

2.3.2 Air Dampers: Damper shall be heavy gauge metal, with shaft rotating in self-lubricating nylon or equal bearings. Shaft shall be marked on the end to indicate the damper blade position. Unit shall be designed for field conversion from normally open to normally closed, or vice versa, without relocating the actuator, changing parts or adding relays. The damper shall seal against a closed-cell foam gasket, to limit close-off leakage to 10 cfm at 4.0" w.g. The damper shall not unseat at 6.0" w.g.

2.3.3 Provide hanger brackets for attachment of supports.

2.3.4 Access: Provide removable panels in casings to permit access to air dampers and other parts requiring service, adjustment, or maintenance.

2.3.5 Controls: Units shall have pressure independent DDC controls provided by the DDC contractor.

The unit inlet shall be equipped with a flow sensor with amplifying pressure pickup points connected to central averaging chambers. The sensor shall maintain control accuracy with the same size inlet duct in any configuration. The flow sensor shall have a minimum of three sensor points.

The terminal unit manufacturer shall supply a metal enclosure with access panel sealed from air flow and mounted on the side of the terminal unit to house field mounted digital controls. The terminal unit manufacturer shall provide a 277V to 24V

controls transformer. Unit shall be provided with disconnect.

The DDC contractor shall provide an actuator. The damper shall move in a smooth, steady progression without dead spots. Refer to controls drawings for sequence of operations.

2.3.6 Hot Water Reheat Coils: Provide factory mounted heating coils constructed of copper tubes and aluminum fins with galvanized steel casing.

2.3.7 Noise Ratings: Provide terminals with the NC performance data scheduled.

3 EXECUTION

3.1 Examine areas and conditions under which air terminals are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install air terminals as indicated, and in accordance with manufacturer's installation instructions.

3.3 Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

3.4 Duct Connections: Connect ductwork to air terminals in accordance with Division-23 ductwork sections.

3.5 Upon completion of installation and prior to initial operation, test and demonstrate that air terminals, and duct connections to air terminals, are leak-tight.

3.6 Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance. Leave operational and ready for Testing and balancing work.

3.7 Clean exposed factory-finished surfaces. Repair any marred or scratched surfaces with manufacturers touch-up paint.

END OF SECTION 233616

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SECTION 23 37 13
GRILLES, REGISTERS, AND CEILING DIFFUSERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets and for balancing of air outlets and inlets; not work of this section.

1.5 Codes and Standards:

1.5.1 ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual". Provide air outlets and inlets bearing ADC Certified Rating Seal.

1.5.2 NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for air outlets and inlets indicating construction, finish, and mounting details.

1.6.2 Performance Data: For each type of air outlet and inlet furnished, provide aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections and data as required.

1.7 O&M Data Submittals: Submit cleaning instructions for finishes and spare parts lists. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 General:

2.1.1 Except as otherwise indicated, provide manufacturer's standard grilles, registers, and ceiling diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

2.1.2 Manufacturers not listed in the following specification will not be considered for approval unless accepted by addendum prior to bid.

2.1.3 Performance: Provide grilles, registers and ceiling diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device equal to the basis of design.

2.1.4 Ceiling and Wall Compatibility: Provide grilles, registers and diffusers with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into ceiling module or wall with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems and walls which will contain each type of ceiling diffuser, grille, or register.

2.1.5 Appearance: All grilles and registers shall be aluminum construction and all diffusers shall be steel or aluminum construction, unless otherwise noted, with uniform matching appearance for each type of outlet. Ceiling mounted grilles and registers shall be set to be sight tight from the predominant exposure.

2.1.6 Finish: All ceiling mounted grilles, registers, and diffusers shall be finished with manufacturer's standard color to be selected by the architect. Wall and door mounted grilles and registers shall be finished with clear anodized finish .

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Titus, Price, Krueger, or Metal Aire.

2.3 Square Ceiling Diffusers: Provide square face, adjustable, 360 degree pattern diffusers with one-piece stamped cones, no corner joints, round necks. Provide lay-in panel as required.

2.4 Return Grilles : Provide return grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations. Provide heavy duty grilles in gym.

2.5 Sidewall Supply Registers: Provide supply registers with two sets of individually adjustable airfoil registers, spaced at 3/4", with the front set parallel to the long dimension. Provide opposed blade damper, screwdriver operated from the face. Provide mounting frame.

3 EXECUTION

3.1 Coordinate installation with ceiling and light fixture installation. Locate ceiling outlets as indicated on architectural Reflected Ceiling Plans. Unless otherwise indicated, locate ceiling outlets in the center of acoustical ceiling modules with sides parallel to the grid.

3.2 Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

3.3 Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

3.4 Set air volumes to values shown on the drawings so that the system is functional.

Leave ready for test and balance contractor.

3.5 Furnish to Owner three operating keys for each type of outlet and inlet that require them; obtain receipt.

END OF SECTION 233713

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SECTION 23 37 26
WALL LOUVERS

1.1 Extent of wall louver work is indicated by drawings and schedules, and by the requirements of this section.

1.2 Refer to other Division-23 sections for ductwork, duct accessories and controls work.

1.3 AMCA Compliance: Test and rate louvers in accordance with AMCA Standard 500. Provide AMCA certified rating seal. Ratings based on tests and procedures performed in accordance with AMCA 500-L and complying with the AMCA 511 Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance, water penetration and wind driven rain ratings.

1.4 Product Qualifications:

1. Miami-Dade County, Florida Notice Of Acceptance (NOA).
2. Florida Building Code Approval.
3. Louver shall be certified to Florida Building Code Testing Application Standards TAS 100(A) (Wind Driven Rain Resistance), TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading).
4. AMCA Listed for compliance to AMCA 540 Level E and AMCA 550 standards.

1.5 Approval Submittals:

1.5.1 Product data: Submit manufacturer's technical product data for louvers including: model number, accessories furnished, construction, finish, mounting details, performance data.

1.6 O&M Data Submittals: Submit maintenance data, including cleaning of finishes and a copy of approval submittals. Include in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, submit products by Ruskin, Greenheck, Arrow, American Warming and Ventilating, or AMCA labeled approved equal.

2.2 General: Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Provide Kynar 500 coated, corrosion resistant finish; color to be selected by the Owner.

2.3 Substrate Compatibility: Provide Florida Product approved louvers with 9 inch frame with flange and sill extension piece that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to general construction drawings and specifications for types of substrate which will contain each type of louver.

2.4 Materials:

2.4.1 Florida Product Approved Louvers: Construct of aluminum extrusions, Alloy 6063-T6 0.081" thick for frame and 0.081" thick for front blades and 0.060" thick for back blades. Weld units or use stainless steel fasteners.

2.5 Sill Flashing: Formed aluminum, 0.080" thick, upturned sides to prevent water leakage.

2.6 Installation Angles: Material: 1.375 x 2.25 inch x 0.125 inch thick continuous aluminum angles around louver perimeter for installation in concrete, deep CMU, steel and wood substrate wall systems.

2.7 Installation Plates: Material: 0.250 inch (6.4 mm) thick continuous aluminum flat or zee plates for installation in thin CMU substrate wall systems.

2.8 Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

2.9 Stationary Florida Product Approved Louvers: Hurricane and impact rated louvers, basis of design is Greenheck EHV-901D.

2.10 Performance Data

2.10.1 EHV-901D:

1. Performance Ratings: AMCA licensed.
   a. Based on testing 48 inches x 48 inches size unit in accordance with AMCA 500-L.
2. Free Area: 42 percent, nominal.
3. Free Area Size: 6.66 square feet.
4. Maximum Recommended Air Flow through Free Area: 2,155 feet per minute.
5. Air Flow: 10,431 cubic feet per minute.
6. Maximum Pressure Drop (Intake): 0.60 inches w.g..
7. Water Penetration: Beginning point of water penetration of 0.01 ounce per ft^2 of free area shall be above 1,250 feet per minute free area velocity.
8. Wind Load Rating: Maximum wind load of ±150 PSF.
9. AMCA 500-L Wind Driven Rain Performance: 99.9 percent effective at preventing water penetration through louver when tested at 50 miles per hour wind with 8 inches per hour rainfall and 2,155 feet per minute airflow through the free area. Penetration Class 'A' with Discharge Class (Intake) '3' in accordance with AMCA 500-L Wind Driven Rain Test.

3 EXECUTION

3.1 Install where shown on the drawings in accordance with the manufacturer's printed instruction and Florida Product Approval. Exercise care to prevent scratches.

3.2 Isolate dissimilar metals per the manufacturer's recommendations.

3.3 Verify size of louvers shown on drawings prior to fabrication. Coordinate with wall openings. Sizes may be altered subject to approval by Engineer provided free area remains approximately the same as indicated.

END OF SECTION 233726

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SECTION 23 52 16
CONDENSING BOILERS

1. GENERAL

1.1. SUMMARY

1.1.1. This Section includes packaged, factory-fabricated and -assembled, gas-fired, firetube stainless steel ultra-high efficiency condensing boilers, trim and accessories for generating hot water.

1.2. REFERENCES

1.2.1. ASME Section IV

1.2.2. CAN-1.3.1-77, Industrial and Commercial Gas Fired Packaged Boilers

1.2.3. CSD-1, Controls and Safety Devices

1.2.4. XL GAPS

1.2.5. NEC, National Electric Code

1.2.6. UL-795 7th Edition

1.2.7. AHRI, BTS-2000

1.2.8. ASHRAE 90.1

1.3. SUBMITTALS

1.3.1. Product Data: Include performance data, operating characteristics, technical product data, rated capacities of selected model, weights (shipping, installed and operating), installation and start-up instructions, and furnished accessory information.

1.3.2. Shop Drawings: For boiler, standard boiler trim and accessories.

1.3.3. End Assembly Drawing: Detail overall dimensions, connection sizes, connection locations, and clearance requirements.

1.3.4. Wiring Diagrams: Detail electrical requirements for the boiler including ladder type wiring diagrams for power, interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

1.3.5. Certificate of Product Rating: Submit AHRI Certificate indicating Thermal Efficiency, Combustion Efficiency, Materials of Construction, Input, and Gross Output conform to the design basis.

1.3.6. Thermal efficiency curves: Submit thermal efficiency curves for a minimum of 5 input rates between and including minimum and maximum rated capacities, for return water temperatures ranging from 80°F to 180°F.

1.3.7. Water side pressure drop curve.

1.3.8. Flue gas temperature curves: Submit flue gas temperature curves for minimum and maximum boiler capacity, for return water temperatures ranging from 80°F to 160°F.

1.3.8.1. If submitted flue gas temperatures, minimum or maximum inputs are different from that of the basis of design manufacturer and model, the manufacturer shall be responsible for draft calculations and reselection of the flue gas exhaust system.

1.3.9. Source quality-control test reports.

1.3.10. Field quality-control test reports: Start-up by a factory authorized service company.

1.3.11. Operation and Maintenance Data: Data to be included in Installation and Operation Manual.

1.3.12. Warranty: Standard warranty specified in this Section.

1.4. QUALITY ASSURANCE

1.4.1. Manufacturer Qualifications: Firms regularly engaged in the manufacture of condensing hydronic boilers with welded steel pressure vessels, whose products have been in satisfactory use in service for not less than twenty-five (25) years. The manufacturer must be headquartered in North America.

1.4.2. Aftermarket Support and Service: The manufacturer shall have a factory authorized service training program, where boiler technicians can attend a training class and obtain certification to perform start-up, maintenance and basic troubleshooting specific to the product line.

1.4.3. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4.4. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code, Section IV “Heating Boilers”, for a maximum allowable working pressure of 160 PSIG.

1.4.5. CSD-1 Compliance: The boiler shall comply with ASME Controls and Safety Devices for Automatically Fired Boilers (CSD-1).

1.4.6. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to “Gas and Oil Fired Boilers - Minimum Efficiency Requirements.”

1.4.7. UL Compliance: Boilers must be tested for compliance with UL 795, “Commercial-Industrial Gas Heating Equipment.” Boilers shall be listed and labeled by ETL.

1.4.8. AHRI Compliance: Boilers shall be tested and rated according to the BTS-2000 test standard and verified by AHRI.

1.4.9. NOx Emissions Compliance: Boiler shall be tested for compliance with SCAQMD and TCEQ.

1.4.10. The equipment shall be of the type, design, and size that the manufacturer currently offers for sale and appears in the manufacturer's current catalog.

1.4.11. The equipment shall fit within the allocated space, leaving ample allowance for maintenance and inspection.

1.4.12. The equipment shall be new and fabricated from new materials. The equipment shall be free from defects in materials and workmanship.

1.4.13. All units of the same classification shall be identical to the extent necessary to ensure interchangeability of parts, assemblies, accessories, and spare parts wherever possible.

1.4.14. In order to provide unit responsibility for the specified capacities, efficiencies, and performance, the boiler manufacturer shall certify in writing that the equipment being submitted shall perform as specified.

1.5. COORDINATION

1.5.1. Mechanical contractor shall coordinate the size and location of concrete bases. Provide anchor bolts for existing concrete base.

1.6. WARRANTY

1.6.1. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.

1.6.1.1. Warranty Period for the Pressure Vessel and Heat Exchanger: The boiler manufacturer shall warranty against failure due to thermal shock, flue gas condensate corrosion, and/or defective material or workmanship for a period of 10 years, non-prorated, from the date of shipment from the factory provided the boiler is installed, controlled, operated and maintained in accordance with the Installation, Operation and Maintenance Manual.

1.6.1.2. Warranty Period for all other components: The boiler manufacturer will repair or replace any part of the boiler that is found to be defective in workmanship or material within eighteen (18) months of shipment from the factory or twelve (12) months from start-up, whichever comes first.

2. PRODUCTS

2.1. MANUFACTURERS

2.1.1. This specification is based on the Endura series boilers as manufactured by Fulton Heating Solutions, Inc. Equivalent units by Viessman, Aerco, or Raypack must meet all performance criteria.

2.1.2. Basis-of-Design Product: Fulton Heating Solutions, Inc.; Endura model **EXE-750** stainless steel firetube condensing boiler.

2.1.3. The boiler shall be a product of a single manufacturer.

2.2. CONSTRUCTION

2.2.1. Description: Factory-fabricated, -assembled, and -pressure tested, stainless steel firetube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including flue gas vent; combustion air intake connections, water supply, water return, condensate drain, and controls. The boiler, burner and controls shall be completely factory assembled as a self-contained unit. Each boiler shall be neatly finished, thoroughly tested, and properly packaged for shipping. Closed-loop water heating service only.

2.2.2. Heat Exchanger: The heat exchanger is defined as the surfaces of the pressure vessel where flue gases transfer sensible and latent heat to the hydronic fluid. The heat exchanger shall be a three-pass firetube design constructed using only stainless steel.

2.2.2.1. The boiler shall be a firetube design, such that all combustion chamber components are within water-backed areas. Watertube boilers will not be accepted.

2.2.2.2. Furnace: First pass of the combustion chamber shall be constructed of stainless steel with a minimum wall thickness of 0.25” and a minimum bottom head thickness of 0.625”.

2.2.2.3. Firetubes: Second and third passes of the combustion chamber shall be constructed of stainless steel having a minimum wall thickness of 0.109”.

2.2.2.4. Furnace to tube connections shall be constructed with low weld intensity, a tube to tube minimum spacing of 2” center to center, minimum 5/8” tube to tube ligament, and shall not contain any overlapping welds.

2.2.2.5. Heat exchange capability shall be maximized within the heat exchanger via the use of corrugated firetube technology. The corrugation process shall not remove any material from the tubes. Aluminum heat transfer enhancements are dissimilar metals and are unacceptable.

2.2.2.6. Material: The heat exchanger shall have the following material characteristics and properties:

2.2.2.6.1. The metallic crystalline lattice microstructure shall contain approximately equal amounts of body center cubic (BCC) and face centered cubic (FCC) structures to offer high resistance to intergranular corrosion.

2.2.2.6.2. A minimum Pitting Resistance Equivalent Number (PREN) of 26.

2.2.2.6.3. A minimum Yield Strength of 65 ksi at 0.2% plastic strain.

2.2.2.6.4. A minimum Ultimate Tensile Strength of 94 ksi.

2.2.2.6.5. To minimize stresses caused by uneven expansion and contraction, the Coefficient of Thermal Expansion at 212°F shall not be less than 7.0 in/in °F 10-6 and shall not be greater than 7.5 in/in °F 10-6.

2.2.2.6.6. To increase resistance to pitting and crevice corrosion, the Chromium content shall not be less than 21% by mass.

2.2.2.6.7. For high mechanical strength, the Nitrogen content shall not be less than 0.17% by mass.

2.2.2.6.8. Boilers with heat exchangers constructed of austenitic stainless steels, such as 316L or 304, and ferritic stainless steels, such as 439, are unacceptable.

2.2.2.6.9. Boilers with heat exchangers constructed of cast aluminum, mild steel, cast iron or copper finned tube materials are unacceptable.

2.2.3. Pressure Vessel: Design and construction shall be in accordance with Section IV of the ASME Code for heating boilers.

2.2.3.1. The shell shall be minimum 0.3125” thick steel, SA-790 or SA-516 Grade 70.

2.2.3.2. The top head shall be a minimum 0.375” thick steel, SA-790 or SA-516 Grade 70.

2.2.3.3. The water side of the pressure vessel shall be a counter-flow design with internal water-baffling plates.

2.2.3.4. The boiler return and supply water connections shall be 4” 150# ANSI flanged. The water connections shall not be designed to support an external structural load from the piping system.

2.2.3.5. The water volume of the boiler shall not be less than 102 Gallons.

2.2.3.6. For boilers with a lower water volume, the boiler manufacturer shall provide a buffer tank and all associated buffer tank ancillaries to make equivalent to the total volume of the design basis.

2.2.3.7. The maximum water pressure drop across the boiler inlet and outlet connections, shall not exceed 0.9 PSID at 150 GPM.

2.2.4. Burner: Standard natural gas, forced draft.

2.2.4.1. Burner Head: Shall be a woven fiber premix design.

2.2.4.2. Excess Air: The burner shall operate at no greater than 7.0% excess O2 over the entire turndown range. Due to significant reductions in combustion efficiency at high

levels of excess O2, boilers exceeding 7.0% excess O2 at any operating condition shall not be accepted.

2.2.4.3. Emissions: When operating on natural gas, the boiler shall maintain a NOx level of <20 ppm, and CO emissions less than 50 ppm, over the complete combustion range at a 3% O_2 correction.

2.2.5. Blower: Variable speed, non sparking, hardened aluminum impeller centrifugal fan to operate during each burner firing sequence and to pre-purge and post-purge the combustion chamber.

2.2.5.1. Motor: Brushless DC variable speed motor with hall effect sensor feedback; internal electronic commutation controller with built in speed control and protection features; long life, sealed, ball bearing with high temperature grease.

2.2.5.2. Variable speed blower: PWM signal input with tachometer output.

2.2.6. Main Fuel Train:

2.2.6.1. The boiler shall have a pre-mix combustion system, capable of operating at a minimum 4" W.C. incoming propane gas pressure while simultaneously achieving emissions performance, full modulation, and full rated input capacity. Maximum natural gas pressure allowed to the inlet of the fuel train shall be no less than 28" W.C.

2.2.6.2. A factory mounted main fuel train shall be supplied. The fuel train shall be fully assembled complete with high and low gas pressure switches, wired, and installed on the boiler and shall comply with CSD-1 code. The fuel train components shall be enclosed within the boiler cabinet.

2.2.6.3. A lock up regulator upstream of the fuel train shall be furnished by the boiler manufacturer as a standard component integral to the boiler cabinet. Factory test fire of the boiler with the provided lock up regulator is required.

2.2.6.4. Standard CSD-1 fuel train shall comply with IRI, which has been replaced by XL GAPS.

2.2.7. Ignition: Direct spark ignition with transformer. Pilot assemblies are not accepted. A UV scanner shall be utilized to ensure precise communication of flame status back to the flame programmer. Flame rods are not accepted.

2.2.8. Boiler Enclosure:

2.2.8.1. Sealed Cabinet: Jacketed steel enclosure with left hinged full height front access door, fully removable latching access panels, gasketed seams to maintain sealed combustion, mounted on a steel skid with steel plate decking.

2.2.8.2. Control Enclosure: NEMA 250, Type 1.

2.2.8.3. Finish: Internally and externally primed and painted finish.

2.2.8.4. Combustion Air: Drawn from the inside of the sealed cabinet, preheating the combustion air.

2.2.9. Rigging and Placement: The boiler shall come with lifting eyes and fork hole accessibility for rigging.

2.2.10. Exhaust Manifold: Shall be constructed of stainless steel, with an area for the collection and disposal of flue gas condensate. The exhaust outlet connection shall allow for immediate vertical rise off the boiler without requiring an elbow or tee.

2.2.11. Characteristics and Capacities:

2.2.11.1. Heating Medium: Closed loop hot water with up to 50% propylene or ethylene glycol by volume. Standard capacities shall be based on 100% water.

2.2.11.2. Design Water Pressure Rating: 160 psig.

2.2.11.3. Safety Relief Valve Setting: 60 psig.

2.2.11.4. Minimum Return Water Temperature: No minimum temperature required.

2.2.11.5. Maximum Allowable Water Temperature: 210°F.

2.2.11.6. Minimum Water Flow Rate: No minimum flow rate required to protect the heat exchanger.

2.2.11.7. Maximum Water Flow Rate: No maximum flow rate requirement.

2.2.11.8. Minimum Delta-T: No minimum delta-T required.

2.2.11.9. Maximum Delta-T: 100°F

2.2.11.10. Minimum Side Clearance: Shall not exceed 1” between any number of boilers.

2.2.11.11. Jacket Losses: External convection and radiation heat losses to the boiler room from the boiler shall comply with IAW ASHRAE 103-2007, and shall not exceed 0.2% of the rated boiler input at maximum capacity.

2.2.12. The boiler shall have its efficiency witnessed and certified by an independent third party, and the efficiency must be listed on the AHRI directory (www.ahridirectory.org) for natural gas operation. The test parameters for efficiency certification shall be the BTS-2000 standard. The certified thermal efficiency for natural gas firing shall not be less than 93.5%

2.2.13. A zero flow or low flow condition shall not cause any harm to the pressure vessel or heat exchanger of the boiler. Flow switches, dedicated circulator pumps, or primary-secondary arrangements shall not be required to protect the boiler from thermal shock. Boilers requiring the use of flow switches or primary-secondary piping arrangements are unacceptable.

2.2.14. The equipment shall be in strict compliance with the requirements of this specification and shall be the manufacturer's standard commercial product unless specified otherwise. Additional equipment features, details, accessories, etc. which are not specifically identified but which are a part of the manufacturer's standard commercial product, shall be included in the equipment being furnished.

2.3. TRIM

2.3.1. Safety Relief Valve: ASME Rated.

2.3.1.1. Pressure and Temperature Gauge: Minimum 3-1/2" diameter, combination pressure and -temperature gauge. Gauges shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.

2.3.1.2. Mounted in the field in the boiler supply water piping prior to the first isolation valve by the boiler installer.

2.3.2. Combustion Air Inlet Filter: 50 Micron.

2.3.3. Flue Gas Condensate Drain Trap: A flue gas condensate drain trap including a cast aluminum condensate tank with makeup water line to prevent positive pressure exhaust gases from entering the boiler room.

2.3.4. Flue Gas Condensate Neutralization: Provide pH neutralization kit to handle a maximum combined boiler capacity of 12,000,000 BTU/hr with a year supply of neutralizing medium. Polyethylene housing with MgO neutralizing medium. accommodations available upon request.

2.4. CONTROLS

2.4.1. The boiler electrical control panel shall include the following devices and features:

2.4.1.1. 7" color touch screen control display factory mounted on the front cabinet panel door.

2.4.1.1.1. The control display shall serve as a user interface for programming parameters, boiler control and monitoring; and shall feature a screen saver, screen disable for cleaning, contrast control, volume control for alarm features, boiler status, configuration, history and diagnostics.

2.4.1.2. The boiler control panel shall be constructed in a UL 508 approved panel shop.

2.4.1.3. 24 VAC control transformer.

2.4.1.4. Control relay for 120 VAC motorized pump control.

2.4.1.5. The flame safeguard control on the boiler shall be integrated with temperature control and lead/lag sequencing modular boiler plant functionality.

2.4.1.6. All controls are to be cabinet, vessel or panel mounted and so located on the boiler as to provide ease of servicing the boiler without disturbing the controls. All controls shall be mounted and wired according to UL requirements.

2.4.2. Burner Operating Controls: To maintain safe operating conditions, factory mounted and wired burner safety controls limit burner operation:

2.4.2.1. High Limit: A single UL 353 temperature probe shall function as a dual-element outlet temperature sensor and shall comply with CSD-1 CW-400 requirements for 2 independent temperature control devices.

2.4.2.1.1. High limit sensor shall be NTC resistive 10KOhm +/- 1% at 77°F. Sensor shall have brass material bulb with 1.181 +/- 0.015” insertion and 0.370 +/- 0.005” bulb diameter.

2.4.2.1.2. Manual reset stops burner if operating conditions rise above maximum boiler design temperature.

2.4.2.2. Low-Water Cut Off: Electronic probe type mounted in the pressure vessel shall prevent burner operation on low water alarm.

2.4.2.3. Air Safety Switch: Prevent operation unless sufficient combustion air is proven.

2.4.2.4. High Condensate Probe: Prevent operation in the event of a blocked condensate drain.

2.4.2.5. Blocked Exhaust: Prevent operation in the event of a blocked flue gas exhaust stack.

2.4.3. Boiler Operating Controls and Features:

2.4.3.1. Proportional Integral Derivative (PID) temperature load control capability for up to two loops, central heat and domestic hot water.

2.4.3.2. Operating temperature limit for automatic start and stop.

2.4.3.3. Flue gas exhaust temperature monitoring.

2.4.3.4. Return water temperature monitoring.

2.4.3.5. Time of day display.

2.4.3.6. Customizable boiler name display.

2.4.3.7. Alarm history for 15 most recent alarms including equipment status at time of lockout.

2.4.3.8. Password protection options.

2.4.3.9. Indirect domestic hot water priority.

2.4.4. Sequencing Control of Modular Boiler Plants: Sequencing capabilities (lead/lag) shall be integral to the boiler controller for up to 8 boilers installed in the same hydronic loop and shall not require an external panel.

2.4.4.1. The boiler manufacturer shall provide a supply water header temperature sensor.

2.4.4.1.1. The sensor shall be NTC resistive 10KOhm +/- 1% at 77°F, field installed in the common supply water piping, and field wired to the master boiler.

2.4.4.2. One (1) boiler in the system shall be field programmed as the master and subsequent boilers will be programmed as lag units.

2.4.4.3. Sequence of Operation:

2.4.4.3.1. Upon call for heat and demand in the system, a boiler will be enabled at low fire and will modulate according to demand and PID settings up to the base load common value. The base load common shall be field adjustable with a default setting of 40%.

2.4.4.3.2. If the heating load exceeds the output at the base load common firing rate, the next boiler in the sequence will be enabled at low fire. Modular boilers will modulate up and down in parallel as a cohesive unit with infinite modulation points to meet heating load requirements.

2.4.4.3.3. This process continues until all available boilers are enabled, at which point they are released to modulate up to full fire if required.

2.4.4.3.4. As the load decreases, the boilers will be sequentially disabled.

2.4.4.3.5. Boiler sequence order shall be rotated on a programmable number of run hours.

2.4.4.3.6. A boiler in lockout alarm shall be automatically removed from the sequence order.

2.4.4.3.7. Lag boilers shall default to local control if the master boiler is fully powered off or removed.

2.4.4.3.8. Each individual boiler shall enable and disable a water circulation control device. The enable of the device, for example a motorized isolation valve or boiler circulator, will be simultaneous with the heat demand for that boiler. The disable of each device will be based on a programmable time delay when the heat demand is no longer present. In variable primary arrangements, the control shall hold the lead boiler isolation valve open at all times.

2.4.5. Building Automation System Interface: Hardware and software to enable building automation system (BAS) to monitor, control, and display boiler status and alarms and adjust setpoints through BACnet interface.

2.4.5.1. Hardwired Contacts:

2.4.5.1.1. Monitoring: Boiler Status, Burner Demand, General Alarm, Firing Rate.

2.4.5.1.2. Control with Factory Installed Jumper: Safety Interlock for External Device, Remote Boiler Enable, Remote Lead/Lag Enable, Emergency Stop (E-Stop

2.5. ELECTRICAL POWER

2.5.1. Single-Point Field Power Connection: Factory-installed and factory-wired switches, transformers, control and safety devices and other devices shall provide a single-point field power connection to the boiler.

2.5.2. Electrical Characteristics:

2.5.2.1. Voltage: 120 V.

2.5.2.2. Phase: Single.

2.5.2.3. Frequency: 60 Hz.

2.6. VENTING

2.6.1. The boiler shall be capable of operating with a stack effect not exceeding -0.04” W.C. and a combined air intake and exhaust venting pressure drop not exceeding +1.50” W.C.

2.6.2. Combustion Air Intake: Combustion air shall be direct vented to the boiler using sealed combustion by drawing combustion air in from the outdoors.

2.6.2.1. Sealed Combustion: Schedule 40 PVC pipe, vent termination with 1/4” x 1/4” mesh bird screen.

2.6.3. Flue Gas Exhaust: The flue gas exhaust stack shall be AL 29-4C or 316L stainless steel, listed and labeled to UL-1738 / C-UL S636 for use with Category II/IV appliances, guaranteed appropriate for the application by the manufacturer and supplier of the venting.

2.6.4. The boiler shall be capable of common exhaust and intake venting. The draft system shall be designed to prevent the backflow of exhaust gases through idle boilers.

2.6.5. Condensate drain piping shall be stainless steel.

2.7. SOURCE QUALITY CONTROL

2.7.1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

2.7.2. Each boiler shall be installed and operated in a functioning hydronic system, inclusive of venting, as part of the manufacturing process. A factory test fire report corresponding to the boiler configuration shall be included with each boiler.

3. EXECUTION

3.1. EXAMINATION

3.1.1. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.

3.1.1.1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

3.1.2. Examine mechanical spaces for suitable conditions where boilers will be installed.

3.1.3. Proceed with installation only after satisfactory conditions have been verified.

3.2. BOILER INSTALLATION

3.2.1. Install boilers level on 6" thick concrete base with continuous waffle style neoprene isolation pads between the boiler frame and concrete. Boiler shall be bolted to concrete pad.

3.2.2. Install gas-fired boilers according to NFPA 54. Equipment and materials shall be installed in an approved manner and in accordance with the boiler manufacturer's installation requirements.

3.2.3. Assemble and install boiler trim.

3.2.4. Install electrical devices furnished with the boiler but not specified to be factory mounted.

3.2.5. Install control wiring to field-mounted electrical devices.

3.2.6. Connect to existing digital controls enable signal.

3.3. CONNECTIONS

3.3.1. Piping installation requirements are specified in other Division-23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3.2. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

3.3.3. Connect gas piping to boiler gas train inlet with isolation valve and union. Piping shall be at least full size of gas train connection. Provide a reducer if required.

3.3.4. Connect hot water supply and return water connections with shutoff valve and union or flange at each connection.

3.3.5. Install piping from safety relief valves to the nearest floor drain.

3.3.6. Install piping from flue gas condensate drain connection to the condensate drain trap and to the nearest floor drain.

3.3.7. Boiler Venting:

3.3.7.1. Install flue venting and combustion air-intake.

3.3.7.2. Connect to boiler connections, flue size and type as recommended by the manufacturer.

3.3.8. Ground equipment according to Division-26 Specifications.

3.3.9. Connect wiring according to Division-26 Specifications.

3.4. FIELD QUALITY CONTROL

3.4.1. Perform tests and inspections and prepare test reports.

3.4.1.1. After boiler installation is completed, the manufacturer shall provide the services of a field representative to inspect components, assemblies, and equipment installations, including connections and provide startup of the boiler and training to the operator.

3.4.1.2. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

3.4.2. Tests and inspections:

3.4.2.1. Perform installation and startup checks according to manufacturer's written instructions.

3.4.2.2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

3.4.2.3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

3.4.2.3.1. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.

3.4.2.3.2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.4.3. Remove and replace malfunctioning units and retest as specified above.

3.4.4. Occupancy Adjustments: When requested within 12 months of startup, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to 2 visits to Project during other than normal occupancy hours for this purpose.

END OF SECTION 23 52 16

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SECTION 23 64 30
PACKAGED AIR COOLED CHILLERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work specified in this section.

1.3 Extent of chiller work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for concrete pads, piping, piping specialties, water temperature and pressure gauges, pumps, and valves which are required external to chillers for installation; not work of this section.

1.5 Refer to other Division-23 sections for field-installed automatic temperature controls required in conjunction with chillers; not work of this section.

1.6 Refer to Division-26 sections for electrical wiring work including wires/cables, raceways, and project required electrical devices; not work of this section.

1.7 Codes and Standards:

1.7.1 ARI Compliance: Test and rate chillers in accordance with ARI Std 550/590, "Standard for Water-Chilling Packages using Vapor Compression Cycle".

1.7.2 NEC Compliance: Comply with applicable NEC requirements pertaining to electrical power and control wiring for construction and installation of chillers.

1.7.3 ANSI Compliance: Comply with ANSI B9.1 safety code requirements pertaining to unit construction of chillers.

Stamp cooler with ASME mark when cooler has been successfully tested in accordance with ASME Code. Pressure test cooler for refrigerant working side pressure of not less than 235 psig and water side pressure of not less than 150 psig. Leak test condenser coils at 150 psig and pressure test coils at 450 psig.

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's technical product data, including rated capacities for chillers indicated, weights (shipping, installed, and operating), furnished specialties and accessories; and rigging, installation, and start-up instructions.

1.8.2 Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, and required clearances, methods of assembly of components, and location and size of each field-connection.

1.9 O&M Data Submittals:

1.9.1 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

1.9.2 Maintenance Data: Submit a copy of approval submittals. Submit maintenance data and parts list for each chiller, control, and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide chillers of one of the following:

Daikin
Trane
York
Carrier

2.2 General: Provide factory-assembled and tested packaged air-cooled scroll compressor liquid chillers as indicated, consisting of compressors, evaporator, condensers, thermal expansion valves, and control panels. Provide capacity and electrical characteristics as scheduled.

2.2.1 Specified capacity shall be met without overloading compressor motors when operating at a scale factor of 0.00010 at the temperatures scheduled.

2.2.2 Unit shall be capable of operation at all conditions between 0ºF and 125ºF ambient.

2.2.3 Chiller EER shall meet the requirements of Florida Energy Efficiency Code and schedules.

2.3 Refrigerant: Provide full operating charge or refrigerant and oil.

2.4 Housing: Provide manufacturer's standard equipment housing construction, corrosion protection coating, and exterior finish. Provide removable panels and/or access doors for inspection and access to internal parts and components. Provide wire guard to protect compressors and other components.

2.5 Evaporator: Single pass brazed plate heat exchanger shall be constructed of stainless steel with copper as the braze material. The heat exchanger shall be designed to withstand a refrigerant side working pressure of 430 psig (29.6 bars) and a waterside working pressure of 150 psig (10.5 bars). Test evaporator at 1.1 times maximum allowable refrigerant side working pressure and 1.5 times maximum allowable water side working pressure. Provide immersion heaters to protect the evaporator to an ambient of -20°F (-29°C). The evaporator shall be insulated with factory-installed 1.25 inch (19.05 mm) Armaflex II or equal (k=0.28) insulation. Foam insulation shall be used on the suction line. Water pipe extensions with insulation shall extend from the evaporator to the edge of the unit. The heat exchanger shall be

protected from freeze damage by electric heat trace tape, served with a separate 120V, 20 amp circuit and controlled by the chiller control panel.

2.6 Condenser: Air-cooled condenser coils shall have aluminum fins mechanically bonded to internally-finned copper tubing or aluminum microchannel construction, either with an integral subcooling circuit. The maximum allowable working pressure of the condenser shall be 650 psig. Condensers shall be factory proof and leak tested at 715 psig. Provide balanced direct-drive vertical discharge condenser fans. Provide three-phase condenser fan motors with permanently lubricated ball bearings and external thermal overload protection. Units shall start and operate from 0°F to 125°F. Units shall operate down to 0°F by a modulating variable speed fan on each circuit to maintain system differential pressure.

2.6.1 Condenser Coil Coating: The condenser box shall be submerged in an epoxy polymer bath where an electrostatic charge to uniformly deposit the epoxy onto the coil, heads, and frame. The coating shall resist bi-metallic corrosion and allow for operation in coastal environments.

2.7 Compressors and Motors: The unit shall be equipped with two or more hermetic, direct-drive, 3600 rpm 60 Hz suction gas-cooled scroll compressors. The simple design shall have only three major moving parts and a completely enclosed compression. Overload protection shall be provided. The compressor shall include: centrifugal oil pump, oil level sight glass and oil charging valve. Each compressor shall have 120v compressor heaters installed and properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.

2.7.1 Provide 5 year compressor warranty covering parts, labor, and refrigerant.

2.8 Refrigerant Circuits and Capacity Modulation: Provide dual independent refrigerant circuits. Each refrigerant circuit shall have scroll compressors piped in parallel with a passive oil management system. A passive oil management system shall maintain proper oil levels within compressors and have no moving parts. Each refrigerant circuit shall include filter drier, electronic expansion valve, and liquid line and discharge service valves. Capacity modulation shall be achieved by staging compressors on and off.

2.9 Refrigerant Circuit: Dual refrigerant circuits shall be completely independent of each other. Provide for each refrigerant circuit the following:

Relief valve.
Liquid line solenoid valve.
Liquid line sight glass/moisture indicator.
Insulated suction line.
Purge valve.

2.10 Unit Controls: The microprocessor-based control panel shall be factory-installed and factory-tested. The control system shall be powered by a pre-wired control power transformer, and shall turn on and off compressors to meet the load. Provide microprocessor-based chilled water reset based on return water. The microprocessor shall automatically act to prevent unit shutdown due to abnormal operating conditions associated with low evaporator refrigerant temperature and high condensing

temperature. If an abnormal operating condition continues and the protective limit is reached, the machine shall shut down. The panel shall include machine protection for the following conditions:

- Low evaporator refrigerant temperature and pressure
- High condenser refrigerant pressure
- Critical sensor or detection circuit faults
- High compressor discharge temperature (with low temp evaporator)
- Lost communication between modules
- Electrical distribution faults: phase loss, phase reversal or over temperature protection
- External and local emergency stop
- Loss of evaporator water flow

When a fault is detected, the control system shall conduct diagnostic checks and displays results. The display will identify the fault, indicate date, time, and operating mode at time of occurrence, and provide type of reset required and a help message.

Clear Language Display Panel Factory-mounted to the control panel door, the operator interface shall have an LCD touch-screen display for operator input and information output. This interface shall provide access to the following information: evaporator report, condenser report, compressor report, ASHRAE Guideline 3 report, operator settings, service settings, service tests, and diagnostics. All diagnostics and messages are displayed in “clear language.” Data contained in available reports shall include:

- Water and air temperatures
- Refrigerant pressures and temperatures
- Flow switch status
- EXV position
- Compressor starts and run-time

All necessary settings and setpoints shall be programmed into the microprocessor-based controller via the operator interface. The controller shall be capable of receiving signals simultaneously from a variety of control sources, in any combination, and priority order of control sources can be programmed. The control source with priority determines active setpoints via the signal it sends to the control panel.

- Local operator interface
- Hard-wired 4-20mA or 2-10V dc signal from an external source
- Time of day scheduling(optional capability available from local operator interface)
- BACNet
- Trane Tracer Summit system

2.11 Accessories: Provide the following accessories:

2.11.1 Suction and discharge gauges.

2.11.2 Vapor-proof chilled water flow switch.

3 EXECUTION

3.1 Installer must examine areas and conditions under which chillers are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 General: Install chillers in accordance with manufacturer's written instructions. Install units plumb and level, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

3.3 Support: Install ground-mounted units on existing concrete pad. Secure to pad with vibration isolation as recommended by manufacturer. If required for alternate manufacturer's equipment, provide reinforced concrete extension to existing pad.

3.4 Chilled Water Piping: Refer to Division-23 section "Chilled Water Piping". Connect inlet to evaporator with controller bulb well, shutoff valve, thermometer, strainer, flow switch, flexible pipe connection, pressure gauge, and union or flange. Connect outlet to evaporator with shutoff valve, balancing cock, thermometer, flexible pipe connection, pressure gauge, and union or flange. Align piping to eliminate strain on chiller heads. Arrange piping to permit removal of chiller heads with minimal pipe removal. Thermometers and gauges shall be located in the equipment room.

3.5 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted, including electric strip cable for chiller to prevent freezing due to low ambient temperature. Heater cable shall be powered by a separate 120V circuit that may be energized when the unit is not. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to manufacturer and equipment installer.

3.6 Control: Furnish field-installed automatic temperature control requirements to Control Installer. Field-installed automatic temperature controls are not work of this section.

3.7 Provide services of manufacturer's factory-trained service representative for at least two days to start-up chillers. Include in start-up procedures, testing controls, checking all wiring connections, demonstration of compliance with requirements, demonstration of performance, and replacement of damaged or malfunctioning controls and equipment. Submit complete operating logs and service report following chiller startup.

3.8 Provide services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of chillers. Schedule training with Owner. Provide at least 7-day notice to Contractor and Engineer of training date.

3.9 The chiller supplier shall employ servicemen qualified to repair the chillers and shall have an office and stock parts within 100 miles of the project. All service mechanics

must be factory trained with a State of Florida Class A license. Servicemen shall maintain 24 hour per day emergency service.

END OF SECTION

SECTION 23 73 23
CUSTOM AIR HANDLING UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air handling unit work is indicated on drawings, and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for field-applied insulation to air handling units.

1.5 Refer to other Division-23 sections for condensate, hot and chilled water piping required in conjunction with air handling units.

1.6 Refer to other Division-23 Sections for HVAC equipment to be included as part of the penthouse units or air handling units such as DDC Controls, Variable Frequency Drives, and Hydronic Specialties.

1.7 Refer to Division-26 sections for the following work; not work of this section.

1.7.1 Power supply wiring from power source to power connection on unit. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory installed by manufacturer.

1.8 Codes and Standards:

1.8.1 AMCA Compliance: Test and rate air handling units in accordance with AMCA standards.

1.8.2 ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", and ARI 410 for coils, display certification symbol on units of certified models.

1.8.3 NFPA Compliance: Provide air handling unit internal insulation, adhesives, and coatings having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems."

1.8.4 UL and NEMA Compliance: Provide electrical components required as part of air handling units, which have been listed and labeled by UL and comply with NEMA Standards.

1.8.5 NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data as follows showing dimensions, weights, capacities, certified ratings, fan performance with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, and installation instructions. Submit assembly-type drawings showing unit dimensions, weight loadings, required clearances, construction details, and field connection details.

Air handling unit components including casings, fans, coils and all related equipment.
Vibration Isolation

1.9.2 Shop Drawings: Submit shop drawings showing the actual installation of each air handling unit, in plan and section. Show coil access, filter access, motor access, controls access and access to any other components requiring service. Show coordination with all related structural components of the building and show all unit supports. Show relationship to drains and other equipment. Show every electrical device and control panel with code-required service clearance clearly marked.

Units mounted in mechanical rooms.

1.10 O&M Data Submittals:

1.10.1 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to air handling units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field installed.

1.10.2 Maintenance Data: Submit a copy of approval submittals. Submit maintenance instructions, including instructions for lubrication, filter replacement, motor and drive replacement, and spare parts lists. Include these data and wiring diagrams in O&M manuals.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air handling units of one of the following:

Daikin Vision
Thermal
Trane

2.2 General:

2.2.1 Factory fabricated air handling units shall be constructed of solid steel, formed outer panels secured to an integral steel frame or to a bolted steel frame. Outer panels shall be removable without affecting the structural integrity of the units. All units shall come complete with a structural steel base around the entire perimeter. Construction shall result in a leakage rate of less than 1% of rated flow at maximum operating pressure.

2.2.2 Multiple sectioned units shall be as a single factory assembled piece (except where shipping limitations prevent) demounted into modular sections in the field by Contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by Contractor.

2.2.3 All units shall be UL or ETL listed.

2.2.4 All coil connections, access doors and drains shall be coordinated with field piping and electrical connections.

2.2.5 Unit exterior dimensions shall be the size as shown on the drawings.

2.3 Testing:

2.3.1 The unit manufacturer shall provide a factory leak test on all units at 8 inches static pressure. Cabinet leakage shall not exceed leak class 6 per ASHRAE 111 at 8 inches w.g. Specified air leakage shall be obtained without the use of caulk at normally removed access panels. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.

2.3.2 Fan shall be factory balanced to limit vibration at operating speed to the values shown in the following table. Measure vibration in all three planes. AHU manufacturer shall provide vibration test results.

2.4 Unit Base / Framework::

2.4.1 Unit base frame shall be structural steel cross members. The base shall include “Double Bottom” insulate floor. Base frames shall be fitted with lifting lugs at the corners of the unit or section (if demounted). Floor panels shall be double-wall construction and designed to support a 250 lb load during maintenance activities and shall deflect no more than 0.0042” per inch of panel span (L/240).

2.5 Exterior Casing:

2.5.1 The air handling unit casing shall be 2” thick double wall construction of the “no-through-metal” design. The casing structure shall incorporate insulating thermal breaks as required so that, when fully assembled, there exists no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide required structural frame and casing to withstand 8" static pressure. Panels shall be gasketed and secured to the frame with screws. Outer panels shall be constructed from 22 gauge G-90 galvanized steel. Provide support system for architectural finish panels. Architectural finish panels are not a part of Division-23 work. The exterior panels shall be coated with a painting system designed for long term corrosion.

The paint shall meet or exceed the following criteria:

(ASTM B-117) salt spray resistance 5% fog at 95 degrees F. Passes 750 hr.
(ASTM D-2247) humidity resistance 100% salt at 95 degrees F. Passes 1,000 hr.

2.6 Unit Casing Insulation: Insulation shall not be disturbed if panels are removed. Insulation shall be secured to the entire panel with mechanical and adhesive over the entire panel surface. Entire unit to be insulated with 2" thick insulation. The insulation shall have an effective thermal the resistance value of R13, minimum.

Insulation shall fill panels and external structural frame members completely in all direction such that no voids exist. Panel insulation shall comply with NFPA 90A.

2.7 Liners: The units shall be double wall construction and include a 20 gauge solid galvanized liner (unless otherwise noted) in the entire unit except for supply fan section. The liner in the supply fan section shall be perforated galvanized steel construction. Insulation facing perforated inner wall shall be covered by a Mylar or Tedlar film with spacers to preserve the acoustical properties of the assembly.

2.8 Condensate Pan: Condensate drain pan shall be 16 gauge Type 304 stainless steel. All pans shall be insulated "Double Bottom" construction with welded corners. The drain shall be sloped in two planes for complete drainage with no standing water in the unit. Drain connections shall be standard 1¼" NPT connection. Drain pans shall be provided under all cooling unit sections.

2.9 Access Doors: The unit shall be equipped with 2" double wall insulated, hinged access doors of the same construction as the interior and exterior wall panels. Doors shall be located upstream and downstream of all coils and in all filter, access plenum and fan sections and access to major components. The fan section door shall be large enough to allow the removal of the fan wheel and motor without disassembly of the unit casing. The door frame shall incorporate a built in thermal break barrier along with a gasket around the entire perimeter of the door. The door shall be hinged using a minimum of three heavy duty butt hinges. There shall be two heavy duty Ventlok (260/310) handles (or equal) per door. Provide an ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors. Operating tool shall be chained to each unit with tamper resistant fasteners within reach of the safety latch. All doors to have windows where shown. All doors to be 60" high when sufficient unit height is available, or maximum height allowed by the unit height.

2.10 Fans: Provide direct drive fans of type and class as specified on the schedule. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested for vibration and alignment at speeds between 25% and 100% of design RPM. If fans are not factory-tested for vibration and alignment, the contractor shall be responsible for cost and labor associated with field balancing and certified vibration performance. Fan wheels shall be keyed to fan shafts to prevent slipping.

2.11 Motors: Provide high efficiency motor. Provide motors suitable for inverter use.

2.11.1 Variable Frequency Drives shall be furnished by the Digital Controls Contractor.

2.12 Coils:

2.12.1 Coil sections shall be double wall with 304 stainless steel inner liner.

2.12.2 All coil assemblies shall be tested under water at 315 psig and performance shall be certified under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be as noted on a coil computer printout.

2.12.3 Type WC (water coils) shall be constructed of seamless copper tubing mechanically expanded into fin collars. Fins shall be the die formed plate type. Headers shall be

seamless copper with die formed tube holes. Connections shall be male pipe thread (MPT) Schedule 40 red brass.

Vents and drains (1/8)" shall be provided for complete coil drainage. Coils shall be suitable for 250 psig working pressure. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter. Coils shall have 5/8" o.d. x .035" wall copper tubes, .010" aluminum fins and 16 gauge Type 304 stainless steel casing. Coil tracks and supports shall be fabricated of Type stainless steel.

2.12.4 Provide multiple sections of coils split vertically and horizontally as required for coil removal. Safe off all spaces between coils to prevent air from bypassing coils.

2.12.5 Provide intermediate stainless steel drain pans beneath each section of cooling coil above bottom section. Provide a drain tube from each intermediate pan down to the base drain pan. Intermediate drain pans shall extend a minimum of 8" past the downstream face of coil.

2.12.6 Insulate all piping within the AHU in accordance with Division-23 section "Insulation for HVAC Equipment and Piping". Repair all cracks in insulation or covering at site after unit has been set. Piping and hydronic devices as well as piping insulation for all units shall be completed in the field.

2.13 Filter Boxes: Provide boxes to accommodate filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the units. Side service filter sections shall include hinged access doors. Internal safing shall be provided by the manufacturer as required to prevent air bypass around the filters.

2.13.1 Filter Gauge: Each filter bank shall be furnished with one (1) Magnehelic filter gauge (Dwyer Series 2000).

2.14 Ducted connection: Provide ductwork connection of sizes shown on the drawings.

2.15 Lighting: Provide vapor-proof light fixtures in all accessible sections. Factory mounted and wired to an external service switch.

2.16 UVC Lights General: Provide factory mounted and wired UVC light system. UVC Light system shall be wired to a switched junction box on the front of the unit at the factory. Provide door interlocking safety switch to turn off light when access door is opened.

2.16.1 UVC Lights: Provide factory assembled emitter and fixture consisting of housing, power source, reflector, Emitter sockets, and emitter. The housing shall be constructed of 304 stainless steel with heavy gage reflector, specular finished aluminum alloy with approximately 85% reflectance at 254 nm wavelength. Provide ½" conduit openings on each end to facilitate coupling and wiring fixture to fixture. The power source shall be a Class P2, electronic, rapid start type with a power factor greater than 0.95 and a power conversion of greater than 75%. The power supply shall include RF and EMI suppression and be designed to maximize photon production, irradiance, and reliability in cold or moving airstreams of 35-170F, 100% RH and up to 2000 FPM velocity. The fixture shall be 115V/60 hz. Emitter sockets shall be medium bi-pin, double click safety, twist lock type, constructed of UVC-resistant polycarbonate. Emitter tubes shall be very high output, hot cathode, T5

diameter, medium bi-pin type that produces broadband UVC of 250-260 nm at 2000 FPM velocity and air temperatures of 35-170F. It shall produce no ozone or other secondary contaminants. The unit shall be tested by an independent test laboratory in accordance with IES Lighting Handbook, 1981 and verified through independent testing to provide output per 1" arc length of not less than 10 uW/cm2 at 1 meter in a 400 FPM airstream at 45F. Units shall comply with UL Standard 1995 for use in HVAC equipment and carry the UL and ULC labels.

2.16.2 UVC Equipment Warranty: Provide equipment parts and labor warranty covering the complete UVC assembly including the fixtures, bulbs, and power supply for a period of three years from the date of start-up. The warranty does not cover normal emitter effectiveness loss due to aging.

2.17 Drains: Provide a capped washdown drain in each coil section.

2.18 Vibration Isolation: Provide Type EM5 Vibration Isolation.

3 EXECUTION

3.1 Examine areas and conditions under which air handling units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install air handling units where indicated, in accordance with equipment manufacturer's published installation instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes. The work of this section includes all equipment necessary for a complete, packaged system, including work and equipment specified in other Division-23 sections.

3.3 Coordination: Coordinate with other work, including architectural panels, ductwork, floor construction and piping, as necessary to interface installation of air handling units with other work.

3.4 Access: Provide access space around air handling units for service as indicated, but in no case less than that recommended by manufacturer.

3.5 Support:

3.5.1 Install floor-mounted air handling units on reinforced concrete housekeeping pads of sufficient height to properly trap condensate, but in no case less than 4".

3.6 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.7 Piping Connections: Refer to Division-23 HVAC sections. Provide piping, valves, accessories, gauges and supports as indicated. Eliminate strain on coil headers. Provide trapped, insulated, DWV copper condensate drain piping full size from the drain connection as shown and extend independently to disposal point as part of this section's work. Provide individual trap from each drain.

3.8 Duct Connections: Refer to Division-23 Air Distribution sections. Provide ductwork, accessories, and flexible connections as indicated.

3.9 Vibration Isolation: Install in accordance with requirements of Division-23 Vibration Isolation.

3.10 Brush out fins on all coils.

3.11 Testing: Upon completion of installation, start-up and operate equipment to demonstrate capability and compliance with requirements. Install final, fixed sheave package. Field correct malfunctioning units, then retest to demonstrate compliance.

3.12 Provide one spare set of belts for each belt-driven fan, obtain receipt from Owner that belts have been received

3.13 Install new filters (prefilters and final filters as applicable) at final completion. Provide two spare sets of filters to owner at final completion

END OF SECTION 237323

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SECTION 23 82 19
FAN COIL UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fan coil unit work is indicated by drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-23 sections for piping; ductwork; and testing, adjusting and balancing of fan coil units; not work of this section.

1.5 Refer to Division-26 sections for the following work; not work of this section.

1.5.1 Power supply wiring from power source to power connection on fan coil unit. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.6 Control wiring specified as work of Division-23 for Automatic Temperature Controls is work of that section.

1.7 Codes and Standards:

1.7.1 ARI Compliance: Test and rate fan coil units in accordance with ARI Standard 440 "Room Fan Coil Air Conditioners."

1.7.2 UL Compliance: Construct and install fan-coil units in compliance with UL 883 "Safety Standards for Fan Coil Units and Room Fan Heater Units".

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's product data for fan coil units showing dimensions, capacities, ratings, performance characteristics, gauges and finishes of materials, and installation instructions. Submit assembly-type drawings showing unit dimensions, construction details, and field connection details.

Fan coil units
Vibration isolation

1.9 O&M Data Submittals:

1.9.1 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to fan coil units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

1.9.2 Maintenance Data: Submit a copy of approval submittals. Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include these data in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide fan coil units of one of the following:

Daikin
Trane
Carrier

2.2 General: Provide fan coil units having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. The basic unit shall include chassis, coils, fanboard, drain pan assembly, fans, housing, motor, filter, and insulation.

2.2.1 Chassis: Construct chassis of galvanized steel with flanged edges.

2.2.2 Insulation: Faced, heavy density glass fiber per NFPA 90A.

2.2.3 Cabinet: Construct of 18-gauge steel removable panels, 16-gauge front. Provide insulation over entire coil section. Clean cabinet parts, bonderize, phosphatize, and flow-coat with baked-on primer.

2.2.4 Coils: Construct of seamless copper tubes mechanically bonded to aluminum fins. Design for 300 psi working pressure, and leak test at 300 psi under water. Provide manual air vents.

2.2.5 Drain Pans: Construct of abs plastic. Insulate with polystyrene or polyurethane insulation and seal with mastic. Pans shall be pitched to drain completely .

2.2.6 Fans: Provide DWDI centrifugal forward curved wheels in galvanized steel fan scrolls, statically and dynamically balanced.

2.2.7 Manifold Piping: Construct of type L copper tubing. Manifold piping shall be provided by the unit manufacturer, but may be shipped separately as a sub-assembly to be fastened to coils in the field. Provide manually operated tight shutoff valves (150 psi working pressure) on each coil of each unit. Provide dielectric unions at all copper connections to steel pipe.

2.2.8 Drip Pans: Provide full drip pan with drain under all manifold piping, valves, instrument wells, and controls.

2.2.9 Motors: Provide high efficiency motors per Division-23 section “Motors”.

2.3 High Capacity Cabinet Fan Coil Units, Non-Ducted: Provide horizontal console units with 1-inch thick insulation, a discharge opening suitable for mounting supply air register, a return air grille, and an insulated plenum. Provide hinged access panels

and 2-inch thick throwaway filters, primary and secondary drain pans. Provide the minimum number of coil rows scheduled. Provide open drip proof motor with electrical characteristics as scheduled permanent split capacitor motor with electrical characteristics as scheduled, direct drive , vibration isolation, and hinged type motor mount. Provide three-speed motors with integral thermal overloads, automatic reset, sleeve bearings with oilers, and vibration isolation. Provide three-speed switch with off position for remote mounting in a junction box.

2.4 Accessories: Provide the following accessories where indicated or scheduled.

2.5 Vibration Isolation: Provide vibration isolation in accordance with Division-23 section “Vibration Isolation” and the following listing.

2.5.1 Equipment Mountings: Type HA3.

3 EXECUTION

3.1 Examine areas and conditions under which fan coil units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install fan coil units as indicated, and in accordance with the manufacturer's installation instructions.

3.3 Locate units as shown and coordinate with other trades

3.4 Provide vibration isolation hangers in accordance with Division-23 section "Vibration Isolation."

3.5 Install trapped, insulated, copper condensate drain piping as shown and extend to disposal point as part of this section's work.

3.6 Install hydronic piping as shown on the coil piping diagram.

3.7 Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer.

3.8 Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.9 After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.

3.10 Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION 238219

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SECTION 260500
ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

The Electrical General Requirements are supplementing and applicable to Division 26 Sections and shall apply to all phases of work specified herein, shown on the Drawings, or required to provide a complete installation of electrical systems. Section 26 is sub-divided for convenience only.

A. This Section includes the following:

1. Job Conditions
2. Regulatory Requirements
3. Electrical equipment coordination and installation.
4. Submittals, Operating and Maintenance instructions and As-built drawings.
5. Common electrical installation requirements.
6. Warranty of work.

1.2 JOB CONDITIONS:

A. Site Inspections: Before submitting proposals, each bidder should visit the site and fully familiarize himself with all job conditions and shall be fully informed as to the extent of his work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities or as to requirements of materials to be furnished. The contractor shall contact the utility prior to bid and make appropriate provisions in such bid as required by the utility for the utility's routing and connection.

B. Scheduled Interruptions: Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by Architect at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until the Architect has granted specific approval. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and materials required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.

C. Accidental Interruptions: All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

1.3 REGULATORY REQUIREMENTS:

A. Permits, Fees, and Inspections: This Contractor shall secure and pay for all permits, and inspections required on work performed under this section of the Specifications. He shall assume full responsibility for all assessments and taxes necessary for the completion and acceptance of the work. The Owner will arrange for utility power including any impact fees.

B. Applicable Standards and Codes: The electrical installation shall comply with all applicable building codes; local, state, and federal ordinances. In case of a discrepancy among these applicable regulatory codes and ordinances, the most stringent requirement shall govern. The Contractor shall notify the Architect in writing of any such discrepancy. Should the Contractor perform any work that does not comply with the applicable regulatory codes and ordinances he shall bear all cost arising in correcting the deficiencies. Application standards and codes shall include all local ordinances, all state laws, and the applicable requirements of the following:

1. American National Standards Institute - ANSI
2. National Electrical Manufacturer's Association - NEMA
3. NFPA editions to be followed are specified in section 2.2 of FFPC, 8th 2023.
4. The National Electric Code – NEC – NFPA 70, 2020 Edition
5. The Life Safety Code – NFPA 101, 2021 Florida Edition
6. The National Fire Alarm Code – NFPA 72, 2021 Florida Edition
7. Florida Building Code, 8th Edition 2023
8. Underwriters' Laboratories, Inc. – UL

C. Drawings and Specifications: The drawings and these specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in the figures or catalog numbers, the matter shall be submitted to the Architect, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.

D. The Contractor shall after completion of the work, furnish the Architect a certificate of final inspection and approval from the applicable local inspection department. The Contractor shall also make necessary changes to plans and specifications to meet code standards at no additional cost to the Owner.

1.4 CONNECTION TO EXISTING UTILITIES:

A. All utility work shall be coordinated with and approved by the local providing utility. Permission for all utility outages shall be requested a minimum of (14) days in advance, unless an emergency arises. Explicit detail shall be shown for all connections to existing utilities. The applicable utility company must approve both the location and the method of the proposed connection.

B. The contractor coordinate procedure to and shall pay for all electric energy consumption during construction as part of the project.

1.5 COOPERATION:

A. Interfacing with Other Crafts: It shall be the responsibility of the Contractor to cooperate and coordinate with all other crafts working on this project. This Contractor shall do all cutting, trenching, backfill and structural removals to permit entry of the electrical system components. The General Contractor shall do all patching and finishing.

B. Equipment Furnished Under Other Sections: This Contractor shall furnish and install, complete electrical roughing-in and connections to all equipment furnished under other sections and indicate on drawings. This includes all outlets as shown on mechanical and electrical drawings. All such equipment shall be set in place as work of other sections.

C. Heating and Air Conditioning:

1. The Contractor shall furnish all branch circuit wiring to motors and control panels or centers including disconnects, receptacles, switches, and appurtenances to which the system at the units may be connected, to provide a complete system of wiring for power. Control equipment and control circuit wiring is specified in the Mechanical Section.

2. Control devices to be included in the branch circuit, except those furnished integrals with the equipment, will be delivered by the Heating and Air Conditioning Contractor and installed by the Electrical Contractor.

1.6 WORKMANSHIP:

All work shall be executed in a neat and substantial manner by skilled workman, well qualified, and regularly engaged in the type of work required. Substandard work shall be removed and replaced by the Contractor at no cost to the Owner.

1.7 APPROVAL OF MATERIALS AND EQUIPMENT:

Prior-Submittals: The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The Specifying Engineer reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing of samples if required. If other equipment manufacturers determine that their equipment will fit in the space and meet the recommended clearances, suit all job conditions, equal or exceed the quality of the specified items, then a request may be made in writing to the Specifying Engineer at least ten (10) business days prior to bid date for permission to be included in the approved equipment list. All data required for evaluation shall accompany the above letter. The Specifying Engineer offers two submittal reviews, if these are unacceptable, only an “as-specified” submittal will be accepted. In addition, all value engineering alternates should only be submitted when directly requested by the owner and must be noted specifically as “VE” alternates to the items specified in the construction documents. A letter from the owner directing the VE effort is strongly encouraged as an accompaniment to any VE submittal.

A. Submittals:

1. Submittals: The Contractor shall submit a list of equipment proposed for installation. Catalog data and shop drawings on all proposed systems and their components shall be submitted. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Provide six (6) copies of submittals and shop drawings as a minimum unless the General Conditions requires a greater number of copies. In lieu of paper copies, the Contractor may submit the submittals in PDF format.
   a. Submittals Schedule: Submittals shall be submitted within thirty (30) days after the contract is awarded. It is not the responsibility of the Engineer to expedite the review

of submittals if the contractor has not adequately prepared the submittals in a time efficient manner. The contractor bears all the responsibility for the added time requirements of resubmittals.

b. Identification: Place a permanent label or title block on each submittal for identification. Each major section of submittals such as power equipment, lighting equipment, fire alarm, etc., shall be secured together in a booklet or stapled with a covering index. The different parts of the submittal shall describe which Specification Section it is referenced. The covering index shall list the following information:
   1) Project name and date
   2) Name, address, and phone number of General contractor and project manager.
   3) Name, address, and phone number of Sub-contractor and project manager.
   4) Supplier of equipment with phone number and person responsible for this project.
   5) Index of each item covered in submittal and model number.
   6) Any deviation from contract documents shall be specifically noted on submittal cover index and specifically identified with highlighting, encircling, or boldly on specific submittal sheet.

c. The submittal shall not be in individual parts per each Specification Section but be combined as a part of a major section such as power equipment, lighting equipment, fire alarm, methods, etc.

2. Electrical and Mechanical/Plumbing/Fire Protection Equipment Coordination:

The electrical power equipment submittals shall be accompanied by a letter verifying coordination of electrical services for all mechanical, plumbing, and fire protection equipment requiring power. The letter shall follow the format listed below.

To: _____
(General Contractor)

Re: _____
(Project name and location)

We the undersigned subcontractors certify that we have coordinated the electrical requirements for mechanical, plumbing, and fire protection sprinkler equipment as evidenced by the coordination chart listed herein.

Item	Load Full Load Amps	1 Phase or 3 Phase	Number of Electrical Connections	Maximum Overcurrent Protection	Minimum Overcurrent Protection	Breaker Proposed	Circuit Proposed

The above list details all required electrical connections for mechanical equipment.

Signed: _____

For: _____
Mechanical Subcontractor

The above list details all required electrical connections for plumbing equipment.

Signed: _____

For: _____
Plumbing Subcontractor

The above list details all required electrical and fire alarm connections for fire protection equipment.

Signed: _____

For: _____
Fire Protection Sprinkler Subcontractor

The above list of equipment has been reviewed and the required connections are being provided. (Any exceptions or request for direction shall be listed here)

Signed: _____

For: _____
Electrical Subcontractor

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protection: 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.

B. Cleaning: 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.

1.9 TESTING AND BALANCING:

Make tests that may be required by the Owner or the Architect in connection with the operation of the electrical system in the buildings. Balance all single-phase loads connected to all panelboards in the buildings to insure approximate equal divisions of these loads on the main secondary power supply serving the buildings. All tests shall be made in accordance with the latest standards of the IEEE and the NEC. The installation shall be tested as defined in the 26 specifications. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made in the presence of the Architect or his representative. The Contractor shall notify the Architect at least twenty-four (24) 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 and shall be made available at the Pre-Final Inspection**.** All faults shall be corrected immediately.

A. A letter shall be written giving the following:

1. Measured amps on each phase of each panel.
2. Resistance to ground of each new grounding electrode.
3. Measured voltage phase to phase and phase to neutral at each panel.
4. Ground continuity and polarity instrument used.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS/AS BUILT DRAWINGS:

A. Four (4) complete sets of instructions containing the manufacturer's Operating and Maintenance (O&M) instructions for each piece of equipment shall be furnished to the Owner. Each set shall be permanently bound and shall have a hard cover. One complete set shall be furnished at the time that the test procedure is submitted, and remaining sets shall be furnished before the Contract is completed. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2" by 11" with large sheets of Drawings folded in. The instructions shall include information for major pieces of equipment and systems. In addition, a CD shall be provided to the Owner with the O&M Manuals and Drawings contained therein.

B. Upon completion of the work and at the time designated, the services of one project engineer shall be provided by the Contractor to instruct the representative of the Owner in the operation and maintenance of the systems.

C. This Contractor shall provide as-built Drawings at the completion of the job. Drawings shall show all significant changes in equipment, wiring, routing, location, etc. All underground conduit routing shall be accurately indicated with locations dimensioned. As-built drawings shall be submitted for review as red-lined on a field hard copy. After review by the Architect, the Contractor will be given digital AutoCAD files and shall make revisions and resubmit final on disk.

D. All signals, communications, data, control, dimming systems, etc. shall be included in the As-Built drawings. Where electrical drawings contain a large number of items that prevent easy discernment of the As-Built system, enlarged details or other graphic methods shall be used to clarify the identification required for As-Builts usage.

E. As-Built drawings shall include the following information:

1. Stub-out locations dimensioned from permanent building lines.
2. Routing of all main feeders and identified as under slab, in slab, above ceiling, etc. also for lighting and power branch circuits the number of conductors shall be included, and for feeders and motor branch circuits the number, size, and insulation of conductors shall be included.
3. Corrected panel board and equipment schedules.
4. Corrected circuit numbers as they appear on the panel board directories.
5. Corrected motor horsepower and full load amperes.
6. Location of major distribution open junction boxes with 2" conduit and over.
7. Location of all underground raceways or duct banks dimensioned from easily identified points with depth indicated from BFG (below finished grade) and by elevation in feet.

1.11 GUARANTEE AND SERVICE:

A. Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the Architect or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1-2015.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

END OF SECTION 26 05 00

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SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less.
3. Metal-clad cable, Type MC, rated 600 V or less.
4. Fire-alarm wire and cable.
5. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire Company.
2. General Cable Technologies Corporation.
3. Okonite Company (The).
4. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.

3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Conductor Insulation – All types may not be indicated below, coordinate with Drawings and intended uses:

1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.
4. Type THHN and Type THWN-2: Comply with UL 83.
5. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
6. Type XHHW-2: Comply with UL 44.

2.2 ALUMINUM BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn aluminum current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Allowed Use Locations: Aluminum conductors may only be used on feeder or distribution circuits larger than 100A. The Drawings typically indicate all conductor sizes in copper. The contractor shall provide a cross reference table for engineer approval prior to any conductor to be substituted with an aluminum conductor.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Wire Company.
2. General Cable Technologies Corporation.
3. Okonite Company (The).
4. Southwire Company.

D. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

E. Conductors: Aluminum, complying with ASTM B800 and ASTM B801.

F. Conductor Insulation – All types may not be indicated below, coordinate with Drawings and intended uses:

1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.

4. Type THHN and Type THWN-2: Comply with UL 83.
5. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
6. Type XHHW-2: Comply with UL 44.

2.3 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Allowed Use Locations: Metal-clad cable, Type MC shall only be used in walls from end of circuit devices (receptacles or switches) up to junction box above ceiling or light fixture. Homerun raceway/conductors shall not be Type MC cable. Wiring between devices within walls are allowed to be in Type MC cable.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable Technologies Corporation.
2. Okonite Company (The).
3. Southwire Company.

D. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

E. Circuits:

1. Single circuit.

F. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

G. Ground Conductor: Insulated.

H. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

I. Armor: Steel, interlocked.

J. Jacket: PVC applied over armor.

2.4 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable Technologies Corporation.
2. Okonite Company (The).
3. Southwire Company.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 16 AWG.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

2.5 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 3 AWG; copper or aluminum for feeders No. 3 AWG and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Walls and Partitions: Type THHN/THWN-2, single conductors in raceway.

E. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

F. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway or Type RHW-2/USE-2 if exterior located.

G. Exposed Branch Circuits, Including in Crawlspaces: Type XHHW-2, single conductors in raceway.

H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway or Metal-clad cable, Type MC.

I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according as required by other Specification sections."

3.4 INSTALLATION OF FIRE-ALARM WIRING

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 280528 "Pathways for Electronic Safety and Security."

1. Install plenum cable in environmental airspaces, including plenum ceilings.

2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system shall be installed in a dedicated pathway system. This system shall not be used for any other wire or cable.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

F. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

D. Prior to conduit/conductor routing to outlets, contractor shall request final verification of locations. Outlets shall be allowed to be moved 10 feet prior to installation with no cost change.

E. Comply with requirements in accompanying Section on Fire Alarm Systems for connecting, terminating, and identifying wires and cables.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to requirements in accompanying Sections in this book of Specifications.

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in accompanying Sections in this book of Specifications.

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to requirements in accompanying Sections in this book of Specifications.

END OF SECTION 260519

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SECTION 260523
CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balanced twisted pair cabling hardware.
2. Low-voltage control cabling.
3. Control-circuit conductors.
4. Fire-alarm wire and cable

1.2 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.

1. Flame Travel Distance: 60 inches or less.
2. Peak Optical Smoke Density: 0.5 or less.
3. Average Optical Smoke Density: 0.15 or less.

C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.

D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

E. RoHS compliant.

2.2 BALANCED TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AMP NETCONNECT; a TE Connectivity Ltd. company.
2. Belden CDT Networking Division/NORDX.
3. General Cable; General Cable Corporation.
4. Hubbell Premise Wiring.
5. Siemon Co. (The).
6. Superior Essex Inc.

C. General Requirements for Balanced Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 5e and/or Category 6 as applicable to product used.
2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.

D. Connecting Blocks: 110-style IDC for Category 5e or Category 6 as applicable Provide blocks for the number of cables terminated on the block, plus 20 percent spare, integral with connector bodies, including plugs and jacks where indicated.

E. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

a. Universal T568A and T568B wiring labels.
b. Labeling areas adjacent to conductors.
c. Replaceable connectors.
d. 12, 24 or 48 ports.

2. Construction: 16-gauge steel and mountable on 19-inch equipment racks or on wall-mountable independent of an equipment rack.

F. Patch Cords: Factory-made, four-pair cables in lengths necessary to connect equipment or as indicated on the Drawings; terminated with an eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant and color coded boots to ensure performance. Patch cords shall have latch guards to protect against snagging.

G. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
3. Marked to indicate transmission performance.

H. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded balanced twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standards.

    a. Category 5e, unshielded balanced twisted pair cable shall comply with IEC 60603-7-2.
    b. Category 5e, shielded balanced twisted pair cable shall comply with IEC 60603-7-3.
    c. Category 6, unshielded balanced twisted pair cable shall comply with IEC 60603-7-4.
    d. Category 6, shielded balanced twisted pair cable shall comply with IEC 60603-7.5.

4. Marked to indicate transmission performance.

I. Faceplate:

1. Port quantity as indicated on the Drawings, vertical single gang faceplates designed to mount to single gang wall boxes.
2. Plastic Faceplate: High-impact plastic. Coordinate color with Drawings and Architect
3. Metal Faceplate: Stainless steel, complying with requirements in "Wiring Devices."
4. For use with snap-in jacks accommodating any combination of balanced twisted pair, optical fiber, and coaxial work area cords.

    a. Flush mounting jacks, positioning the cord at a 45-degree angle.

J. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.3 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. Multi-pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

2.4 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

B. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway.

D. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.

1. Smoke control signaling and control circuits.

2.5 FIRE-ALARM WIRE AND CABLE

A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

D. Provide plenum rated cabling in plenum ceilings.

2.6 SOURCE QUALITY CONTROL

A. Factory test balanced twisted pair cables according to TIA-568-C.2.

B. Cable will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Test balanced twisted pair cables on receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
1. Outlet boxes shall be no smaller than 4 inches (102 mm) square by **1-1/2 inches (38 mm)** deep with extension ring sized to bring edge of ring to within 1/8 inch (3.1 mm) of the finished wall surface.
2. Flexible metal conduit shall not be used.

B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

C. Install manufactured conduit sweeps and long-radius elbows if possible.

D. Raceway Installation in Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard if entering the room from overhead.
4. Extend conduits 4 inches above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA-568-C Series of standards.
2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.

5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
6. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
11. Support: Do not allow cables to lay on removable ceiling tiles.
12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
13. Provide strain relief.
14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
15. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.

C. Balanced Twisted Pair Cable Installation:

1. Comply with TIA-568-C.2.
2. Install termination hardware as specified in "Communications Copper Horizontal Cabling" unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in "Raceways and Boxes for Electrical Systems."

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.

F. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.

3. Below each feed point, neatly coil a minimum of 72 inches of cable in a coil not less than 18 inches in diameter.

3.4 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits; No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.5 FIRESTOPPING

A. Comply with TIA-569-D, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping" Chapter.

3.6 GROUNDING

A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.

B. For low-voltage control wiring and cabling, comply with requirements "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

A. Comply with requirements for identification specified in "Identification for Electrical Systems."

B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire shall have a unique tag.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.

B. End-to-end cabling will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:
   1. Ground bonding common with lightning protection system.
   2. Foundation steel electrodes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

   1. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
      a. Ground rods.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO; a brand of nVent.
3. Galvan Industries, Inc.; Electrical Products Division, LLC.
4. O-Z/Gedney; a brand of Emerson Industrial Automation.
5. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

B. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

C. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

E. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

F. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

G. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.

H. Straps: Solid copper, copper lugs. Rated for 600 A.

I. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

J. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Die-cast zinc alloy.
b. Listed for direct burial.

2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.5 GROUNDING ELECTRODES

K. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

L. Ground Plates: 1/4 inch thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.

B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

B. All raceways and enclosures containing service conductors shall have a supply side bonding jumper to the neutral bus at the service entrance.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. Use exothermic welds for all below-grade connections.
3. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

E. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

H. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohms.
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Steel slotted support systems.
2. Aluminum slotted support systems.
3. Conduit and cable support devices.
4. Support for conductors in vertical conduit.
5. Structural steel for fabricated supports and restraints.
6. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
7. Fabricated metal equipment support assemblies.

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 the following:

a. Slotted support systems, hardware, and accessories.
b. Clamps.
c. Hangers.
d. Sockets.
e. Eye nuts.
f. Fasteners.
g. Anchors.
h. Saddles.
i. Brackets.

2. Include rated capacities and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, undefined:

    a. Allied Tube & Conduit; a part of Atkore International.
    b. B-line, an Eaton business.
    c. Thomas & Betts Corporation; A Member of the ABB Group.
    d. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.

1. Manufacturers: Subject to compliance with requirements, undefined:

    a. Cooper Industries, Inc.
    b. Thomas & Betts Corporation; A Member of the ABB Group.
    c. Unistrut; Part of Atkore International.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Channel Material: 6063-T5 aluminum alloy.
4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
5. Channel Width: Selected for applicable load criteria.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, undefined:
1) Hilti, Inc.
2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
3) MKT Fastening, LLC.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Manufacturers: Subject to compliance with requirements, undefined:
1) B-line, an Eaton business.
2) Hilti, Inc.
3) ITW Ramset/Red Head; Illinois Tool Works, Inc.
4) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M, Grade A325 .
6. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1) NECA 1.
2) NECA 101
3) NECA 102.

4) NECA 105.
5) NECA 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC and RMC may be supported by openings through structure members, according to NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb .

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000 psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 260529

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SECTION 260533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. "Penetration Firestopping" for firestopping at conduit and box entrances.
2. "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
3. "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit; a part of Atkore International.
    b. O-Z/Gedney; a brand of Emerson Industrial Automation.
    c. Southwire Company.
    d. Thomas & Betts Corporation; A Member of the ABB Group.
    e. Wheatland Tube Company.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

    a. Comply with NEMA RN 1.
    b. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit; a part of Atkore International.
    b. O-Z/Gedney; a brand of Emerson Industrial Automation.
    c. Southwire Company.
    d. Thomas & Betts Corporation; A Member of the ABB Group.
    e. Wheatland Tube Company.

2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for EMT:

    a. Material: Steel.
    b. Type: Setscrew or compression.

7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. RACO; Hubbell.
   b. Thomas & Betts Corporation; A Member of the ABB Group.
   c. United Fiberglass.

2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fiberglass:

   a. Comply with NEMA TC 14.
   b. Comply with UL 2515 for aboveground raceways.
   c. Comply with UL 2420 for belowground raceways.

4. ENT: Comply with NEMA TC 13 and UL 1653.
5. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
6. LFNC: Comply with UL 1660.

B. Nonmetallic Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. RACO; Hubbell.
   b. Thomas & Betts Corporation; A Member of the ABB Group.
   c. United Fiberglass.

2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

   a. Fittings for LFNC: Comply with UL 514B.

4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business.
2. Hoffman; a brand of nVent.

3. MonoSystems, Inc.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 Type 3R unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. EGS/Appleton Electric.
3. Hoffman; a brand of nVent.
4. Hubbell Incorporated.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. RACO; Hubbell.
7. Thomas & Betts Corporation; A Member of the ABB Group.
8. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

E. Nonmetallic Floor Boxes: Nonadjustable, rectangular or round, as indicated on Drawings.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are allowed.

K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

L. Cabinets:

1. NEMA 250, Type 1 Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armorcast Products Company.
b. Oldcastle Enclosure Solutions.
c. Quazite: Hubbell Power Systems, Inc.

2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC IMC.
2. Concealed Conduit, Aboveground: GRC IMC EMT RNC, Type EPC-40-PVC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: IMC. Raceway locations include but not limited to the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: IMC.
7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

G. Install surface raceways only where indicated on Drawings.

H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches of enclosures to which attached.

L. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to IMC before rising above floor.

M. Stub-Ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

Q. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

R. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

S. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

T. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

U. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

V. Surface Raceways:

1. Install surface raceway with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

W. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

X. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

Y. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

Z. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

AA. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

BB. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

CC. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

DD. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

EE. Locate boxes so that cover or plate will not span different building finishes.

FF. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

GG. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

HH. Set metal floor boxes level and flush with finished floor surface.

II. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install handholes with bottom below frost line

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

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SECTION 260544
SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Advance Products & Systems, Inc.
    b. Metraflex Company (The).
    c. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Emerson
    b. Innerlynx, Eaton Crouse-Hinds, a Cooper Industries Company
    c. Link-Seal, GPT an EnPro Industries Company
    d. Metraflex

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have a VOC content of 50 g/L or less.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

   a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
   b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Comply with NFPA 70E and "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an white field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.
    d. Neutral: White
3. Colors for 277/480-V Circuits:

    a. Phase A: Brown
    b. Phase B: Orange
    c. Phase C: Yellow
    d. Neutral: Gray
4. Color for Equipment Grounds: Bare copper, Green, or Green with a yellow stripe.

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES ."

E. Equipment Identification Labels:

1. White letters on a black background.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3.5-mil thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
   1. Minimum Nominal Size:
      a. 1-1/2 by 6 inches for raceway and conductors.
      b. 4 by 6 inches for arch flash warning labels.
      c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameter and that stay in place by gripping action.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around item being identified. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and is 12 inches wide. Stop stripes at legends.

D. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

E. Underground-Line Warning Tape:

   1. Tape:
      a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications lines.
      b. Printing on tape shall be permanent and shall not be damaged by burial operations.
      c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

   2. Color and Printing:
      a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
      b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE"
      c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

3. Description:

    a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, compounded for direct-burial service.
    b. Width: 3 inches.
    c. Overall Thickness: 5 mils.
    d. Foil Core Thickness: 0.35 mil.
    e. Weight: 28 lb/1000 sq. ft.
    f. Tensile according to ASTM D882: 70 lbf and 4600 psi.

F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 SIGNS

A. Baked-Enamel Signs:
1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:
1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.

C. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Thickness:

    a. For signs up to 20 sq. in., minimum 1/16 inch thick.
    b. For signs larger than 20 sq. in., 1/8 inch thick.
    c. Engraved legend with black letters on white face
    d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D638: 12,000 psi (82.7 MPa).

3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and/or any emergency operations.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER"
2. "POWER"
3. "UPS"
4. “LIFE SAFETY”

M. Vinyl Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
3. Provide label on each receptacle indicating panel and circuit designation.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
2. Install underground-line warning tape for direct-buried cables and cables in raceways.

X. Write-on Tags:

1. Place in a location with high visibility and accessibility.

Y. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.

Z. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.

AA. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.

BB. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER"
2. "POWER"
3. "UPS"
4. “LIFE SAFETY”

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags self-adhesive wraparound labels with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.

H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

J. Workspace Indication: Apply floor marking tape and stencil] to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

K. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

L. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

M. Arc Flash Warning Labeling: Self-adhesive labels.

N. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.

O. Emergency Operating Instruction Signs: Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and other emergency operations.

P. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign.

END OF SECTION 260553

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SECTION 260923
DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Distributed Digital Lighting Control System: System includes
   1. Digital Lighting Controls

1.2 RELATED SECTIONS

A. Section 265119 – LED Interior Lighting.

B. Section 265213 – Emergency and Exit Lighting

1.3 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association.

B. NEMA - National Electrical Manufacturers Association

C. FCC emission standards

D. UL - Underwriters Laboratories, Inc. Listings

E. UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products Installed in Air-Handling Spaces.

F. UL 20 - General Use Switches

G. UL 924 - Standard for Emergency Lighting and Power Equipment

H. ULC - Underwriter Laboratories of Canada Listings

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Digital Lighting Management System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.

B. System shall conform to requirements of NFPA 70.

C. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.

D. System shall be listed under UL sections 916 and/or 508.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Catalog sheets and specifications.
   2. Ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

3. Storage and handling requirements and recommendations.
4. Installation instructions.

C. Shop Drawings: Wiring diagrams a for the various components of the System specified including:
1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
2. Show location of all devices, including at minimum sensors, load controllers, and switches/dimmers for each area on reflected ceiling plans.
3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
4. Network riser diagram including floor and building level details. Include network cable specification. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Closeout Submittals:
1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
2. Operation and Maintenance Manual:
a. Include approved Shop Drawings and Product Data.
b. Include Sequence of Operation, identifying operation for each room or space.
c. Include manufacturer's maintenance information.
d. Operation and Maintenance Data: Include detailed information on device programming and setup.
e. Include startup and test reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing of centralized and distributed lighting control systems with a minimum of 10 years documented experience.

B. Installer Qualifications: Company certified by the manufacturer and specializing in installation of networked lighting control products with minimum three years documented experience.

C. System Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section. Meeting to be attended by Contractor, Architect, system installer, factory authorized manufacturer's representative, and representative of all trades related to the system installation.

B. Review installation procedures and coordination required with related Work and the following:
1. Confirm the location and mounting of all devices, with special attention to placement of switches, dimmers, and any sensors.
2. Review the specifications for low voltage control wiring and termination.
3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
4. Discuss requirements for integration with other trades

C. Inspect and make notes of job conditions prior to installation:
1. Record minutes of the conference and provide copies to all parties present.
2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.

3. Installation shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
   1. Ambient temperature: 32 to 104 degrees F (0 to 40 degrees C).
   2. Relative humidity: Maximum 90 percent, non-condensing.

1.10 WARRANTY

A. Products Warranty: Manufacturer shall provide a 5 year limited warranty on products within this installation, except where otherwise noted, and consisting of a one for one device replacement.

1.11 MAINTENANCE AND OPERATIONAL SERVICES

A. Remote Access and Enhanced Warranty for Networked Lighting Controls: Provide Manufacturer's Remote Access and Enhanced Warranty for Networked Lighting Controls as follows:
   1. Configure to allow the manufacturer remote access to the lighting control system. Configuration includes at a minimum: cellular modem, antenna for the modem, cellular service contract and any connections required to enable communication to the specified Network Lighting Control system.
   2. Remote Access program will automatically trigger a First Year Enhanced Warranty Agreement that will start once lighting control system startup is complete and accepted by the Owner. During this one year period, the Owners authorized site contact can request the manufacturer to check the system for proper operation, and make any programmable changes desired. Manufacturer shall provide a phone number dedicated to customer calls concerning Remote Accessible systems, and a support organization capable of enabling cellular communication to the system for troubleshooting and making requested changes to the system. Any user attempting to request remote support on the system shall be fully verified by the Remote Operations Center (ROC) before providing remote support or making any changes to the system. Systems that allow the modem to be always accessible will not be acceptable. Access must be by a secured VPN connection to the private lighting control network that is completely isolated from the Owner's internal network. Remote access that requires a connection through the Owner's internal network is not acceptable.
   3. Remote Access Program may be continued by the Owner after the first year. However, If the Owner does not continue the enhanced warranty the cellular contract will lapse, and all hardware components, while still remaining property of the manufacturer, will remain in situ so that they can be re-activated at a later time should the Owner desire.
   4. Manufacturer's Remote Access capability shall provide at a minimum the following features:
      a. Ability to provide initial system diagnostics through LMCS Software to detect fault conditions in hardware or connected devices.
      b. Access to all devices via LMCS Software allowing for programmability of device features. This will include all scheduling of Time of Day Events and programming of individual device parameters to meet Sequence of Operation requirements.
      c. Access to the LMSM Segment Manager browser-based interface (if included on

project) to verify it is setup per project documentation, and all functional operations are working properly.

d. On demand access to manufacturer technical support via a Remote Operations Center (ROC) that will provide remote troubleshooting, diagnostics, and configuration/programming assistance.
e. Additional client training and tuning on the Lighting Control System after building occupancy can be performed while remotely connected to the site.
f. Remote Site Readiness Check (SRC) which allows the Remote Operations Center to perform a remote discovery of all devices connected to the lighting control network during installation. DLM Networked projects that have a RACCESS cellular modem and have successfully completed the Site Readiness Check (SRC) process will receive priority scheduling (a SRC is considered successful if 80% or more of the networked devices are found on the network during discovery). After the scheduled on site startup, all manufacturer provided startup work for a site with a successful SRC will be done remotely, or via later complimentary return trips.

B. Technology-Enabled Service Contract: The manufacturer of the Lighting Control System shall provide a service contract for continued support of the system post installation that combines secure yet immediately accessible remote support with the backup assurance of onsite support when necessary. The coverage levels and features of the selected service contract would apply immediately upon completion of startup and supersede any enhanced remote support offered by the manufacturer during the first year after startup.
1. Technology-enabled service contract requires a RACCESS (Remote Access) secure cellular connection that allows the manufacturer remote access to the lighting control system to provide remote troubleshooting, diagnostics, and configuration/programming assistance. Manufacturer shall ensure provision of a cellular service plan that keeps the modem active through the chosen Technology-Enabled Service Contract's duration.
2. If the customer does not renew the Service Contract at the end of the contract term, the cellular service plan will lapse, and all hardware components will remain in situ so that they can be re-activated later should the customer desire.
3. Technology-Enabled Service Contract Specifics
   a. Provide a complete "Connect Plus" Service Contract that includes the following features:
      1) Priority access to manufacturer technical support via a Remote Operations Center
      2) A complete system backup of LMCS and Segment Manager software files semi-annually
      3) Semi-annual Device Health Checks to identify any devices that have been bypassed, disconnected, or not functioning with recommendations for resolution
      4) An annual onsite training session by a certified factory-trained technician
      5) Semi-annual system tuning visits to optimize the lighting configuration, fine tune the Sequence of Operations or make programming changes to the system
      6) A 3 day onsite response time for unscheduled emergency visits provided by factory-trained technicians
4. Length of Technology-Enabled Service Contract:
   a. 1 Year
   b. 2 Year

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: WattStopper, nLight, Sensor Switch.

B. Substitutions: Submit for evaluation.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

A. System General: Provide Digital Lighting Management System (DLM) complete with all necessary enclosures, wiring, and system components to ensure a complete and properly functioning system as indicated on the Drawings and specified herein. If a conflict is identified, between the Drawing and this Specification, contact the Architect for clarification prior to proceeding.
   1. Space Control Requirements as provided in the lighting controls matrix

B. Equipment Required: Lighting Control and Automation system as defined under this section covers the following equipment.
   1. Digital Lighting Management (DLM) local network: Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
   2. Digital Room Controllers: Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
   3. Digital Occupancy Sensors: Self-configuring, digitally addressable, calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
   4. Digital Switches: Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
   5. Configuration Tools: Handheld remote for room configuration and relay panel programming provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away.
   6. Digital Lighting Management (DLM) segment network: Linear topology, BACnet MS/TP network (1.5 twisted pair, shielded) to connect multiple DLM local networks for centralized control.
   7. Network Bridge: Provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS) and automatically creates BACnet objects representative of connected devices.
   8. Segment Manager: BACnet MS/TP-based controller with web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
   9. Programming and Configuration Software: Optional PC-native application capable of accessing DLM control parameters within a room, for the local network, via a USB adapter, or globally, for many segment networks simultaneously, via BACnet/IP communication.

C. Local Network LMRJ-Series: DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.
   1. Features of the DLM local network include:
      a. Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
      b. Simple replacement of any device in the local DLM network with a standard off the shelf unit without requiring significant commissioning, configuration or setup.
      c. Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
      d. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
   2. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices

are not acceptable.

3. If manufacturer's pre-terminated Cat5e cables are not used for the installation each cable must be individually tested and observed by authorized service representative following installation.

2.3 DIGITAL LOAD CONTROLLERS (ROOM AND FIXTURE CONTROLLERS)

A. Digital Load Controllers: Digital controllers for lighting zones, fixtures loads automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting control requirements. Controllers are simple to install, and do not have dip switches/potentiometers, or require special configuration for standard Plug n' Go applications. Control units include the following features

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
2. Simple replacement using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf device.
3. Multiple room controllers connected together in a local network must automatically arbitrate with each other, without requiring any configuration or setup, so that individual load numbers are assigned starting with load 1 to a maximum of 64, assigned based on each controller's device ID's from highest to lowest.
4. Device Status LEDs to indicate:
    a. Data transmission
    b. Device has power
    c. Status for each load
    d. Configuration status
5. Quick installation features including:
    a. Standard junction box mounting
    b. Quick low voltage connections using standard RJ-45 patch cable
6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
    a. Turn on to 100 percent
    b. Turn off
    c. Turn on to last level
7. Each load be configurable to operate in the following sequences based on occupancy:
    a. Auto-on/Auto-off (Follow on and off)
    b. Manual-on/Auto-off (Follow off only)
8. Polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.
9. BACnet object information shall be available for the following objects:
    a. Load status
    b. Schedule state, normal or after-hours
    c. Demand Response enable and disable
    d. Room occupancy status
    e. Total room lighting watts
    f. Electrical current
    g. Total watts per controller
    h. Total room watts/sq ft.
    i. Force on/off all loads
10. UL 2043 plenum rated
11. Manual override and LED indication for each load
12. Zero cross circuitry for each load
13. All digital parameter data programmed into an individual room controller controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

14. Dimming Room Controllers shall share the following features:
    a. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
    b. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
    c. The following dimming attributes may be changed or selected using a wireless configuration tool:
        1) Establish preset level for each load from 0-100 percent
        2) Set high and low trim for each load
        3) Initiate lamp burn in for each load of either 0, 12 or 100 hours
    d. Override button for each load provides the following functions:
        1) Press and release for on/off control
        2) Press and hold for dimming control
    e. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver. LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
    f. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100 percent dimming range defined by the minimum and maximum calibration trim.
    g. Calibration and trim levels must be set per output channel. Devices that set calibration or trim levels per controller (as opposed to per load) are not acceptable.
    h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

B. On/Off Room Controllers shall include:
    1. Dual voltage (120/277 VAC, 60 Hz) capable rated for 20A total load
    2. One or two relay configuration
    3. Simple 150 mA switching power supply (Only 4 100 series devices on a Cat 5e local network)
    4. Three RJ-45 DLM local network ports with integral strain relief and dust cover

C. On/Off/0-10V Dimming KO Mount Room Controllers shall include:
    1. Dual voltage (120/277 VAC, 60 Hz) capable rated for 10A total load
    2. Optional real time current and voltage monitoring (with - M Monitoring option).
    3. One or two relays configurations
    4. Smart 150 mA switching power supply
    5. Two RJ-45 DLM local network ports. Provide molded strain relief ring
    6. One dimming output per relay
        a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting
    7. Units capable of providing both Class 1 or Class 2 wiring for the 0-10V output

2.4 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

A. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
    1. Digital calibration and pushbutton configuration for the following variables:
        a. Sensitivity, 0-100 percent in 10 percent increments
        b. Time delay, 1-30 minutes in 1 minute increments
        c. Test mode, Five second time delay
        d. Detection technology, PIR, Ultrasonic or Dual Technology activation and/or re-

activation.
e. Walk-through mode
2. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
3. Programmable control functionality including:
a. Each sensor may be programmed to control specific loads within a local network.
b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
e. Ultrasonic and Passive Infrared
f. Ultrasonic or Passive Infrared
g. Ultrasonic only
h. Passive Infrared only
i. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
4. One or two RJ-45 port(s) for connection to DLM local network.
5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
6. Device Status LEDs, which may be disabled for selected applications, including:
a. PIR detection
b. Ultrasonic detection
c. Configuration mode
d. Load binding
7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
8. Manual override of controlled loads.
9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

B. BACnet object information shall be available for the following objects:
1. Detection state
2. Occupancy sensor time delay
3. Occupancy sensor sensitivity, PIR and Ultrasonic

C. Units shall not have any dip switches or potentiometers for field settings

D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

2.5 DIGITAL WALL SWITCHES

A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features:
1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Configuration LED on each switch that blinks to indicate data transmission.
4. Load/Scene Status LED on each switch button with the following characteristics:
a. Bi-level LED
b. Dim locator level indicates power to switch

c. Bright status level indicates that load or scene is active
d. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.

5. Programmable control functionality including:
   a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
   b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
6. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

B. BACnet object information shall be available for the following objects:
   1. Button state
   2. Switch lock control
   3. Switch lock status

C. Two RJ-45 ports for connection to DLM local network.

D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

E. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa.
   1. Individual button function may be configured to Toggle, On only or Off only.
   2. Individual scenes may be locked to prevent unauthorized change.
   3. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
   4. Ramp rate may be adjusted for each dimmer switch.
   5. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.

2.6 HANDHELD CONFIGURATION TOOLS

A. Provide a wireless configuration tool to facilitate customization of DLM local networks using two-way infrared communications, and/or PC software that connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include but not be limited to:
   1. Two-way infrared (IR) communication with DLM IR-enabled devices within a range of approximately 30 feet.
   2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
   3. Must be able to read and modify parameters for load controllers and relay panels, occupancy sensors, wall switches, daylighting sensors, network bridges, and identify DLM devices by type and serial number.
   4. Save up to eight occupancy sensor setting profiles, and apply profiles to selected sensors.
   5. Temporarily adjust light level of any load(s) on the local network, and incorporate those levels in scene setting. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
   6. Adjust or fine-tune daylighting settings established during auto-configuration, and input light level data to complete configuration of open loop daylighting controls.
   7. Set room mode for testing of Normal Hours (NH) and After Hours (AH) parameter settings.
   8. Verify status of building level network devices.

2.7 DLM SEGMENT NETWORK

A. Provide a segment network using linear topology, BACnet-based MS/TP subnet to connect DLM local networks (rooms) and LMCP relay panels for centralized control.
   1. Each connected DLM local network shall include a single network bridge (LMBC-300), and the network bridge is the only room-based device that is connected to the segment network.
   2. Network bridges, relay panels and segment managers shall include terminal blocks, with provisions for separate "in" and "out" terminations, for segment network connections.
   3. Segment network utilizes 1.5 twisted pair, shielded, cable supplied by the lighting control manufacturer. Maximum cable run for each segment is 4,000 feet. Conductor-to-conductor capacitance of the twisted pair shall be less than 30 pf/ft and have a characteristic impedance of 120 Ohms.
   4. Network wire jacket is available in high visibility green, white, or black.
   5. Substitution of manufacturer-supplied cable is not permitted and may void the warranty, if non-approved cable is installed, and if terminations are not completed according to manufacturer's specific requirements.
   6. Network signal integrity requires that each conductor and ground wire be correctly terminated at every connected device.
   7. Segment networks shall be capable of connecting to any of the following: BACnet-compliant BAS (provided by others) directly via MS/TP, or BACnet/IP via an NB-ROUTER or LMSM Unit. Systems whose room-connected network infrastructure require gateway devices to provide BACnet data to a BAS are unacceptable

2.8 NETWORK BRIDGE

A. Network bridge module connects a DLM local network to a BACnet-compliant segment network for communication between rooms, relay panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. Network bridge shall use industry standard BACnet MS/TP network communication and an optically isolated EIA/TIA RS-485 transceiver.
   1. Network bridge shall be provided as a separate module connected on the local network through an available RJ-45 port.
   2. Provide Plug n' Go operation to automatically discover room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
   3. Network bridge shall automatically create standard BACnet objects for selected DLM devices to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the DLM devices on each local network. BACnet objects will be created for the addition or replacement of any given DLM device for the installed life of the system. Products requiring that an application-specific point database be loaded to create or map BACnet objects are not acceptable. Systems not capable of providing BACnet data for control devices via a dedicated BACnet Device ID and physical MS/TP termination per room are not acceptable. Standard BACnet objects shall be provided as follows:
      a. Read/write the normal or after hours schedule state for the room
      b. Read the detection state of each occupancy sensor
      c. Read the aggregate occupancy state of the room
      d. Read/write the On/Off state of loads
      e. Read/write the dimmed light level of loads
      f. Read the button states of switches
      g. Read total current in amps, and total power in watts through the load controller
      h. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
      i. Activate a preset scene for the room
      j. Read/write daylight sensor fade time and day and night setpoints

k. Read the current light level, in foot-candles, from interior and exterior photosensors and photocells
l. Set daylight sensor operating mode
m. Read/write wall switch lock status
n. Read watts per square foot for the entire controlled room
o. Write maximum light level per load for demand response mode
p. Read/write activation of demand response mode for the room
q. Activate/restore demand response mode for the room

2.9 SEGMENT MANAGER

A. For networked applications, the Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser utilizing either unencrypted TCP/IP traffic via a configurable port (default is 80) or 256 bit AES encrypted SSL TCP/IP traffic via a configurable port (default is 443).

B. Each segment manager shall have integral support for at least three segment networks. Segment networks may alternately be connected to the segment manger via external BACnet-to-IP interface routers and switches, using standard Ethernet structured wiring. Each router shall accommodate one segment network. Provide the quantity of routers and switches as shown on the Drawings.

C. Operational features of the Segment Manager shall include the following:
1. Connection to PC or LAN via standard Ethernet TCP/IP via standard Ethernet TCP/IP with the option to use SSL encrypted connections for all traffic.
2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser. The Segment Manager shall not require installation of any lighting control software on an end-user PC.
3. Log in security capable of restricting some users to view-only or other limited operations.
4. Segment Manager shall provide two main sets of interface screens - those used to initially configure the unit (referred to as the config screens), and a those used to allow users to dynamic monitor the performance of their system, and provide a centralized scheduling interface. Capabilities using the Config Screens shall include:
a. Automatic discovery of DLM devices and relay panels on the segment network(s). Commissioning beyond activation of the discovery function shall not be required to provide communication, monitoring or control of all local networks and lighting control panels.
b. Allow information for all discovered DLM devices to be imported into the Segment Manager via a single XML based site file from the Software, significantly reducing the time needed to make a system usable by the end user. Importable information can include text descriptions of every DLM component and individual loads, and automatic creation of room location information and overall structure of DLM network. Info entered into LMCS should not have to be re-entered manually via keystrokes into the Segment Manager
c. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
d. Ability to view and modify DLM device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation including sensor time delays and sensitivities, and load response to sensor including Manual-On or Auto-On.
e. Provide capabilities for integration with a BAS via a commonly accepted protocol. At a minimum, the following points shall be available to the BAS via connection to the segment manager: room occupancy state; room schedule mode; room switch lock control; individual occupancy sensor state; room lighting power; room plug-load power;

load ON/OFF state; load dimming level; panel channel schedule state; panel relay state; and Segment Manager Group schedule state control. Any of above items shall be capable of being moved into an "Export Table" that will provide any integrator with only the data they need, and by using the Export Table effectively create a firewall between the integrator's request for info and the overall system performance.

5. Capabilities using the Segment Manager's Dashboard Screens shall include:
   a. A dynamic "tile" based interface that allows easy viewing of each individual room's lighting power consumption, and lighting power density (power consumption information requires Enhanced DLM Room Controllers with integral current transducers such as LMRC-21x).Tiles will be automatically organized according to location so a single tile for the building summarizes all information for tiles beneath it on every floor, in every area, in every room. Tiles use three color coded energy target parameters, allowing an owner to quickly identify rooms that are not performing efficiently. Tiles for rooms with occupancy sensors shall include an icon to indicate whether that room is occupied. Tiles shall be clickable, and when clicked the underlying hierarchical level of tiles shall become visible. Tile interface shall be accessible via mouse, or touch screen devices. Tiles shall be created automatically by the segment manager, based on the information found during the device discovery and/or information included in a file imported in from LMCS (such as tagged descriptions for each room) without any custom programming.
   b. Ability to set up schedules for DLM local networks (rooms) and panels. Schedules shall be capable of controlling individual rooms with either on/off or normal hours/after hours set controlled zones or areas to either a normal hours or after hours mode of operation. Support for annual schedules, holiday schedules and unique date-bound schedules, as well as astro On or astro Off events with offsets. Schedules shall be viable graphically as time bars in a screen set up to automatically show scheduled events by day, week or month.
   c. For fixtures that are accessible via the Segment Network, and have CCT capability as specified under paragraph Digital Wall Switch and Timer For Correlated Color Temperature, the Segment Manager will provide schedule functionality similar to the CCT Wall Timer, allowing all CCT fixtures across the entire facility to be scheduled together.
   d. Ability to provide a simple time vs. power graph based on information stored in each Segment Manager's memory (typically two to three days' data).
6. If shown on the Drawings, Segment Managers shall be integrated into a larger control network by the addition of a Network Supervisor package. The Supervisor is a server level computer running a version of the Segment Manager interface software with dedicated communication and networking capability, able to pull information automatically from each individual Segment Manager in the network. By using a Supervisor, information for individual Segment Managers can be accessed and stored on the Supervisor's hard drive, eliminating the risk of data being overwritten after a few days because of Segment Manager memory limits.
7. Segment Manager shall allow access and control of the overall system database via Native Niagara AX FOX connectivity. Systems that must utilize a Tridium Niagara controller in addition to the programming, scheduling and configuration server are not acceptable.

D. Segment Manager v2.2 and later shall support multiple DLM rooms as follows:
   1. Support up to 120 network bridges and 750 digital in-room devices (LMSM-3E).
   2. Support up to 200 network bridges and 1,100 digital in room devices, connected via network routers and switches (LMSM-6E).

2.10 PROGRAMMING, CONFIGURATION AND DOCUMENTATION SOFTWARE

A. PC-native application for optional programming of detailed technician-level parameter information for all DLM products, including all parameters not accessible via BACnet and the handled IR

configuration tool. Software must be capable of accessing room-level parameter information locally within the room when connected via the optional LMCI-100 USB programming adapter, or globally for many segment networks simultaneously utilizing standard BACnet/IP communication.

B. Additional parameters exposed through this method include but are not limited to:
   1. Occupancy sensor detection LED disable for performance and other aesthetic spaces where blinking LEDs present a distraction.
   2. Six occupancy sensor action behaviors for each controlled load, separately configurable for normal hours and after hours modes. Modes include: No Action, Follow Off Only, Follow On Only, Follow On and Off, Follow On Only with Override Time Delay, Follow Off Only with Blink Warn Grace Time, Follow On and Off with Blink Warn Grace Time.
   3. Separate fade time adjustments per load for both normal and after hours from 0 - 4 hours.
   4. Configurable occupancy sensor re-trigger grace period from 0 - 4 minutes separate for both normal hours and after hours.
   5. Separate normal hours and after hours per-load button mode with modes including: Do nothing, on only, off only, on and off.
   6. Load control polarity reversal so that on events turn loads off and vice versa.
   7. Per-load DR (demand response) shed level in units of percent.
   8. Load output pulse mode in increments of 1second.
   9. Fade trip point for each load for normal hours and after hours that establishes the dimmer command level at which a switched load closes its relay to allow for staggered On of switched loads in response to a dimmer.

C. Generation of reports at the whole file, partial file, or room level. Reports include but are not limited to:
   1. Device list report: All devices in a project listed by type.
   2. Load binding report: All load controller bindings showing interaction with sensors, switches, and daylighting.
   3. BACnet points report: Per room Device ID report of the valid BACnet points for a given site's BOM.
   4. Room summary report: Device manifest for each room, aggregated by common BOM, showing basic sequence of operations.
   5. Device parameter report: Per-room lists of all configured parameters accessible via hand held IR programmer for use with O&M documentation.
   6. Scene report: All project scene pattern values not left at defaults (i.e. 1 = all loads 100 percent, 2 = all loads 75 percent, 3 = all loads 50 percent, 4 = all loads 25 percent, 5-16 = same as scene 1).
   7. Occupancy sensor report: Basic settings including time delay and sensitivities for all occupancy sensors.

D. Network-wide programming of parameter data in a spreadsheet-like programming environment including but not limited to the following operations:
   1. Set, copy/paste an entire project site of sensor time delays.
   2. Set, copy/paste an entire project site of sensor sensitivity settings.
   3. Search based on room name and text labels.
   4. Filter by product type (i.e. LMRC-212) to allow parameter set by product.
   5. Filter by parameter value to search for product with specific configurations.

E. Network-wide firmware upgrading remotely via the BACnet/IP network.
   1. Mass firmware update of entire rooms.
   2. Mass firmware update of specifically selected rooms or areas.
   3. Mass firmware upgrade of specific products

PART 3 EXECUTION

3.1 PREPARATION

A. Do not begin installation until measurements have been verified and work areas have been properly prepared.

B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that required pre-installation meeting specified in Part 1 of this specification has been completed, recorded meeting minutes have been distributed and all outstanding issues noted have been resolved prior to the start of installation.

3.2 INSTALLATION

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

B. Install all room/area devices using manufacturer's factory-tested Cat 5e cable with pre-terminated RJ-45 connectors.
   1. If pre-terminated cable is not used for room/area wiring, each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the Work.
   2. If fixtures have internal DLM Control Modules, ensure that they are also connected with Cat 5e cable.
   3. Install all room to room network devices using manufacturer-supplied LM-MSTP network wire or wireless devices. Network wire substitution is not permitted and may result in loss of product warranty.
   4. Low voltage wiring topology must comply with manufacturer's specifications.
   5. Route network wiring as indicated on the Drawings as closely as possible. Document final wiring location, routing and topology on as built drawings.

C. All line voltage connections shall be tagged to indicate circuit and switched legs.

D. Test all devices to ensure proper communication.

E. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.

F. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
   1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
   2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
   3. Load Parameters (e.g. blink warning, etc.)

G. Post start-up tuning - Adjust sensor time delays and sensitivities to meet the Owner's requirements 30 days from beneficial occupancy. Provide a detailed report to the Architect / Owner of post start-up activity.

H. Tighten all panel Class I conductors from both circuit breaker and to loads to torque ratings as marked on enclosure UL label.

I. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.

J. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.

K. Verify all non-panel-based lighting loads to be free from short circuits prior to connection to room controllers.

L. Remote Access for Network Systems: If "REMOTE ACCESS AND ENHANCED WARRANTY FOR NETWORKED SYSTEMS" is specified in Part 1 of this specification, ensure Segment Manager enclosure is installed in a location with good to excellent cellular phone coverage based on building orientation and geographic location, and mount magnetic antenna for the modem. For cases where alternate mounting locations are not available and a stronger cellular signal is needed, the manufacturer shall offer additional antenna options to improve signal quality. Verify final mounting location with Engineer and Owner prior to proceeding with the Work.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Notify Architect and Manufacturer in writing a minimum of 3 weeks prior to system start-up and testing.

B. Tests and Inspections: Manufacturer's service representative shall perform the following inspections and prepare reports.
   1. Verify Class I and II wiring connections are terminated properly by validating system performance.
   2. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
   3. Verify / complete task programming for all switches, dimmers, time clocks, and sensors.
   4. Verify that the control of each space complies with the Sequence of Operation.
   5. Correct any system issues and retest..

C. Provide a report in table format with drawings, or using a software file that can be opened in the manufacturer's system software including each room or space that has lighting control installed. Indicate the following:
   1. Date of test or inspection.
   2. Loads per space, or Fixture Address identification.
   3. Quantity and Type of each device installed
   4. Reports providing each device's settings.

3.4 DEMONSTRATION AND TRAINING

A. Before Substantial Completion, arrange and provide a one-day Owner instruction period to designated Owner personnel. Set-up, starting of the lighting control system and Owner instruction includes:
   1. Confirmation of entire system operation and communication to each device.
   2. Confirmation of operation of individual relays, switches, and sensors.
   3. Confirmation of system Programming, photocell settings, override settings, etc.
   4. Provide training to cover installation, programming, operation, and troubleshooting of the lighting control system.

3.5 PRODUCT SUPPORT AND SERVICE

A. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

END OF SECTION 260923

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SECTION 26 24 13
SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service and distribution switchboards rated 600 V and less.
2. Disconnecting and overcurrent protective devices.
3. Instrumentation.
4. Identification.

1.2 ACTION SUBMITTALS

A. Product Data: For each switchboard, overcurrent protective device, surge protection device, ground-fault protector, accessory, and component.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
7. Include schematic and wiring diagrams for power, signal, and control wiring.
8. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 2.1 and trained in electrical safety as required by NFPA 70E.

B. Testing Agency or Contractor Qualifications: Member company of NETA or an NRTL.

1.5 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and permanent or temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 104 deg F (40 deg C).
    b. Altitude: Not exceeding 6600 feet (2000 m).

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace switchboard enclosures, buswork, overcurrent protective devices, accessories, and factory installed interconnection wiring that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

B. Manufacturer's Warranty: Manufacturer's agrees to repair or replace surge protection devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D, a division of Schneider Electric
2. G.E., a division of ABB
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. Submit other manufacturer’s for evaluation.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Comply with NEMA PB 2.

D. Comply with NFPA 70.

E. Comply with UL 891.

F. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

G. Nominal System Voltage: 480Y/277 V.

H. Main-Bus Continuous: 1200 A.

I. Indoor Enclosures: Steel, NEMA 250, Type 1.

J. Outdoor Enclosures: Type 3R

1. Finish: Factory-applied finish in manufacturer's standard color; undersurfaces treated with corrosion-resistant undercoating.
2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking, and ventilated openings.

K. Service Entrance Rating: Switchboards intended for use as service entrance equipment shall contain from one to six service disconnecting means with overcurrent protection, a neutral bus with disconnecting link, a grounding electrode conductor terminal, and a main bonding jumper.

L. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

M. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from the front of the switchboard.
2. Phase- and Neutral-Bus Material: Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
3. Tin-plated aluminum feeder circuit-breaker line connections.
4. Ground Bus: 1/4-by-2-inch- (6-by-50-mm-) hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
5. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
6. Disconnect Links:

    a. Isolate neutral bus from incoming neutral conductors.
    b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.

7. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.

N. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.2 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 200 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long and short time adjustments.
    d. Ground-fault pickup level, time delay, and I squared t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
6. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
7. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
    c. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
    e. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.3 INSTRUMENTATION

1. Current Transformers: NEMA EI 21.1; 5 A, 60 Hz, secondary; solid core type; 600V class, 0.6kV, 10kV BIL Full Wave insulation class. +/- 1% accuracy class with burden consistent with connected metering and relay devices.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:

1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:

    a. Phase Currents, Each Phase: Plus or minus 0.5 percent.
    b. Phase-to-Phase Voltages, Three Phase: Plus or minus 0.5 percent.

c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 0.5 percent.
d. Megawatts: Plus or minus 1 percent.
e. Megavars: Plus or minus 1 percent.
f. Power Factor: Plus or minus 1 percent.
g. Frequency: Plus or minus 0.1 percent.
h. Accumulated Energy, Megawatt Hours: Plus or minus 1 percent; accumulated values unaffected by power outages up to 72 hours.

2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.

2.4 IDENTIFICATION

A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, and store switchboards according to NECA 400.

B. Install switchboards and accessories according to NECA 400.

C. Equipment Mounting: Install switchboards on concrete base, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in "Cast-in-Place Concrete."

1. Install conduits entering underneath the switchboard, entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend 2 inches (50-mm) above concrete base after switchboard is anchored in place.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to switchboards.
6. Anchor switchboard to building structure at the top of the switchboard if required or recommended by the manufacturer.

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.

E. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

F. Install filler plates in unused spaces of panel-mounted sections.

G. Install overcurrent protective devices, surge protection devices, and instrumentation.

1. Set field-adjustable switches and circuit-breaker trip ranges.

H. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Acceptance Testing:

a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
b. Test continuity of each circuit.

2. Test ground-fault protection of equipment for service equipment per NFPA 70.
3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

B. Switchboard will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain switchboards, overcurrent protective devices, instrumentation, and accessories.

END OF SECTION 26 24 13

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SECTION **262416**
PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6. Include wiring diagrams for power, signal, and control wiring.
7. Key interlock scheme drawing and sequence of operations.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. Enclosures: Flush and/or Surface-mounted, as indicated on Drawings, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

2. Height: 84 inches (2.13 m) maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

E. Phase, Neutral, and Ground Buses: **Tin-plated aluminum**.

F. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: **Tin-plated aluminum**.
2. Main and Neutral Lugs: Compression type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Compression type, with a lug on the bar for each pole in the panelboard.
4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

G. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.

H. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

2.3 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D, a division of Schneider Electric
2. G.E., a division of ABB
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. Submit other manufacturer's for evaluation.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.

D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D, a division of Schneider Electric
2. G.E., a division of ABB
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. Submit other manufacturer's for evaluation.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D, a division of Schneider Electric
2. G.E., a division of ABB
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. Submit other manufacturer's for evaluation.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

    a. Inverse time-current element for low-level overloads.
    b. Instantaneous magnetic trip element for short circuits.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers: all circuit breakers sized 200A and larger shall be electronic trip type.

    a. RMS sensing.
    b. Field-replaceable rating plug or electronic trip.
    c. Digital display of settings, trip targets, and indicated metering displays.
    d. Multi-button keypad to access programmable functions and monitored data.
    e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
    f. Integral test jack for connection to portable test set or laptop computer.
    g. Field-Adjustable Settings: refer to plans for specific settings per breaker.

        1) Instantaneous trip.
        2) Long- and short-time pickup levels.
        3) Long and short time adjustments.
        4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
6. Subfeed Circuit Breakers: Vertically mounted.
7. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.
    c. UL listed for reverse connection without restrictive line or load ratings.
    d. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
    e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.

f. Ground-Fault Protection: **Integrally mounted** relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
g. Shunt Trip: **24-V** trip coil energized from separate circuit, set to trip at 7**5** percent of rated voltage.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NECA 407.

C. Mount panels at height above finished floor so that no operating handle of switch or circuit breaker in the on position is higher than 79 inches (2000 mm).

D. Mount panelboard cabinet plumb and rigid without distortion of box.

E. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Stub four 1-inch (27-EMT) empty conduits from panelboard into accessible ceiling space if so constructed or space designated to be ceiling space in the future. Stub four 1-inch (27-EMT) empty conduits into raised floor space or below slab not on grade.

J. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in "Identification for Electrical Systems."

E. Install warning signs complying with requirements in "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-grade receptacles, 125 V, 20 A.
2. GFCI receptacles, 125 V, 20 A.
3. Toggle switches.
4. Wall-box dimmers.
5. Wall plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

B. Wiring Devices:

1. Bryant Electric, Inc., Hubbell Subsidiary.
2. Eagle Electric Manufacturing Co.
3. Hubbell Incorporated; Wiring Device-Kellems.
4. Leviton Mfg Company
5. Pass & Seymour/Legrand; Wiring Devices Div.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. SPD Devices: Blue.

F. Wall Plate Color: Thermoplastic. Architect to select finish.

G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.3 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Description: Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Standards: Comply with UL 498 and FS W-C-596.

2.4 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
2. Configuration: NEMA WD 6, Configuration 5-20R.
3. Type: non**feed** through.
4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:

1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
2. Configuration: NEMA WD 6, Configuration 5-15R.
3. Type: **Non-feed** through.
4. Standards: Comply with UL 498 and UL 943 Class A.

5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.5 TOGGLE SWITCHES, 120/277 V, 20 A

A. Two-Pole Switches, 120/277 V, 20 A: Comply with UL 20 and FS W-S-896.

2.6 DIMMERS

A. Wall-Box Dimmers:
   1. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
   2. Control: Continuously adjustable **slider**; with single-pole or three-way switching.
   3. Standards: Comply with UL 1472.
   4. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 5 percent of full brightness.

2.7 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. Single and combination types shall match corresponding wiring devices.

   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces: **Thermoplastic**
   3. Material for Unfinished Spaces: **Galvanized steel**
   4. Material for Damp Locations: **Cast aluminum** with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant**, die-cast aluminum** in-use type with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

   1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
3. Install wiring devices after all wall preparation, including painting, is complete.

C. Device Installation:

1. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
3. Provide label indicating panel and circuit designation on all receptacles.

D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:

1. Install dimmers within terms of their listing.
2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Receptacle switches.
4. Shunt trip switches.
5. Molded-case circuit breakers (MCCBs).
6. Molded-case switches.
7. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

D. DPST: double pole single throw

1.3 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF and SKM electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.

1. Include the following:

a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF and SKM format electronic format.

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.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Square D, a division of Schneider Electric
2. G.E., a division of ABB
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products

2.3 NONFUSIBLE SWITCHES

A. Type GD, General Duty, Three Pole, Single Throw, 240-V ac, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

B. Type HD, Heavy Duty, Three Pole, Single Throw, **600**-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Hookstick Handle: Allows use of a hookstick to operate the handle.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be **finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1)**, **gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12)**].

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be **externally operable with the operating mechanism being an integral part of the box, not the cover250 Type 1)**, **directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R)**. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, **Type 1**.
2. Outdoor Locations: NEMA 250, **Type 3R**.
3. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.3 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NFPA 70 and NECA 1.

3.4 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 262816

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SECTION 26 32 13.13
GASEOUS EMERGENCY ENGINE GENERATORS

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 packaged engine generators for emergency use with the following features:

1. Natural gas engine.
2. Gaseous fuel system.
3. Control and monitoring.
4. Generator overcurrent and fault protection.
5. Generator, exciter, and voltage regulator.
6. Outdoor engine generator enclosure.
7. Vibration isolation devices.
8. Finishes.

B. Related Requirements:

1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

A. EPS: Emergency power supply.

B. EPSS: Emergency power supply system.

C. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Include thermal damage curve for generator.
3. Include time-current characteristic curves for generator protective device.

4. Include fuel consumption in cubic feet per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
5. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F (35, 27, 21, and 10 deg C). Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
7. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactance, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For[Installer manufacturer and testing agency.

B. Field quality-control reports.

C. Warranty: For special warranty.

D. This system shall be supplied by an original equipment manufacturer (OEM) who has been regularly engaged in the production of engine-alternator sets, automatic transfer switches, and associated controls for a minimum of 25 years, thereby identifying one source of supply and responsibility. Approved suppliers are Generac Industrial Power or an approved equal.

E. The manufacturer shall have printed literature and brochures describing the standard series specified, not a one-of-a-kind fabrication.

F. Manufacturer’s authorized service representative shall meet the following criteria:

1. Certified, factory trained, industrial generator technicians.
2. Service support 24/7.
3. Service location within 200 miles.
4. Response time of 4 hours.
5. Service & repair parts in-stock at performance level of 95%.
6. Offer optional remote monitoring and diagnostic capabilities.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
b. Operating instructions laminated and mounted adjacent to generator location.
c. Training plan.

1.7 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. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
2. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Generac Power Systems

B. Caterpillar

C. Kohler Co.

D. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. B11 Compliance: Comply with B11.19.

B. NFPA Compliance:

1. Comply with NFPA 37.
2. Comply with NFPA 70.
3. Comply with NFPA 110 requirements for Level 2 EPSS.

C. UL Compliance: Comply with UL 2200.

D. Engine Exhaust Emissions: Comply with EPA Tier 2 requirements and applicable state and local government requirements.

E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator, including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 5 to 104 deg F (Minus 15 to plus 40 deg C).
2. Altitude: Sea level to [1000 feet (300 m).

G. Unusual Service Conditions: Engine generator equipment and installation are required to operate under the following conditions:

1. High salt-dust content in the air due to sea-spray evaporation.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Power Rating: Stand-By.

D. Service Load: 250 Kw (312.5 Kva).

E. Power Factor: 0.8, lagging.

F. Frequency: 60 Hz.

G. Voltage: 480-V ac.

H. Phase: Three-phase, four-wire wye.

I. Induction Method: Turbocharged.

J. Governor: Adjustable isochronous, with speed sensing.

K. Mounting Frame: Structural-steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

L. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of components.

M. Engine Generator Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage, from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency, from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time: No greater than 10 seconds to comply with NFPA 110, Type 10, system requirements.

2.4 ENGINE

A. Fuel: Natural gas.

B. Rated Engine Speed: 1800 rpm.

C. Lubrication System: Engine or skid mounted.

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 2 equipment for heater capacity and with UL 499.

E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant-system pressure for engine used. Equip with gage glass and petcock.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.

    a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

F. Muffler/Silencer: Commercial type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

1. Minimum sound attenuation of 12 dB at 500 Hz.
2. Sound level measured at a distance of 25 feet (8 m) from exhaust discharge after installation is complete shall be 80 dBA or less.

G. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

H. Starting System: 12-V electric, with negative ground.

1. Components: Sized so they are not damaged during a full engine-cranking cycle, with ambient temperature at maximum specified in "Performance Requirements" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.

5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F (minus 40 to plus 60 deg C) to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GASEOUS FUEL SYSTEM

A. Natural Gas Piping: Comply with requirements in Section 231123 "Facility Natural Gas Piping."

B. Gas Train: Comply with NFPA 37.

C. Engine Fuel System:

1. Natural Gas, Vapor-Withdrawal System:

    a. Carburetor.
    b. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valve.

2. Fuel Filters: One for each fuel type.
3. Manual Fuel Shutoff Valve.
4. Flexible Fuel Connectors.

2.6 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

B. Provide minimum run-time control set for 30 minutes, with override only by operation of a remote emergency-stop switch.

C. Comply with UL 508A.

D. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.

1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6.

E. Control and Monitoring Panel:

1. Digital controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
2. Instruments: Located on the control and monitoring panel and viewable during operation.

    a. Engine lubricating-oil pressure gage.
    b. Engine-coolant temperature gage.
    c. DC voltmeter (alternator battery charging).
    d. Running-time meter.
    e. AC voltmeter, for each phase.
    f. AC ammeter, for each phase.
    g. AC frequency meter.
    h. Generator-voltage adjusting rheostat.

3. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication as required by NFPA 110 for Level 2 system, including the following:

    a. Cranking control equipment.
    b. Run-Off-Auto switch.
    c. Control switch not in automatic position alarm.
    d. Overcrank alarm.
    e. Overcrank shutdown device.
    f. Low water temperature alarm.
    g. High engine temperature pre-alarm.
    h. High engine temperature.
    i. High engine temperature shutdown device.

j. Overspeed alarm.
k. Overspeed shutdown device.
l. Coolant low-level alarm.
m. Coolant low-level shutdown device.
n. Coolant high-temperature prealarm.
o. Coolant high-temperature alarm.
p. Coolant low-temperature alarm.
q. Coolant high-temperature shutdown device.
r. Battery high-voltage alarm.
s. Low-cranking voltage alarm.
t. Battery-charger malfunction alarm.
u. Battery low-voltage alarm.
v. Lamp test.
w. Contacts for local and remote common alarm.
x. Remote manual-stop shutdown device.
y. Integral manual-stop NEMA 3R shutdown device installed adjacent to control panel door on exterior enclosure. Push button shall be protected from accidental operation.
z. Hours of operation.
aa. Engine generator metering, including voltage, current, hertz, kilowatt, kilovolt ampere, and power factor.

F. Connection to Datalink:

1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication.
2. Provide connections for datalink transmission of indications to remote data terminals via ModBus. Data system connections to terminals are covered in Section 260913 "Electrical Power Monitoring and Control."

G. Remote Alarm Annunciator: Comply with NFPA 99. An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

1. Overcrank alarm.
2. Coolant low-temperature alarm.
3. High engine temperature pre-alarm.
4. High engine temperature alarm.
5. Low lube oil pressure alarm.
6. Overspeed alarm.
7. Low coolant level alarm.
8. Low-cranking voltage alarm.
9. Contacts for local and remote common alarm.
10. Audible-alarm silencing switch.
11. Air shutdown damper when used.
12. Run-Off-Auto switch.
13. Control switch not in automatic position alarm.
14. Lamp Test.
15. Generator overcurrent-protective-device not-closed alarm.

H. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.

I. Remote Emergency-Stop Switch: Flush; NEMA 3R; wall mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.

1. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

B. Generator Circuit Breaker: Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.

1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
2. Trip Settings: Selected to coordinate with generator thermal damage curve.
3. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H.

D. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

E. Enclosure: Level 2 Acoustic Weatherproof Enclosure rated for 180mph wind speeds..

F. Instrument Transformers: Mounted within generator enclosure.

G. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
2. Maintain voltage within 30 percent on one step, full load.
3. Provide anti-hunt provision to stabilize voltage.

4. Maintain frequency within 15 percent and stabilize at rated frequency within five seconds.

H. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

I. Subtransient Reactance: 12 percent, maximum.

2.9 OUTDOOR ENGINE GENERATOR ENCLOSURE

A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 180 mph (290 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

1. Sound Attenuation Level: 2.

B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 180 mph (290 km/h).

C. Hinged Doors: With padlocking provisions.

D. Space Heater: Thermostatically controlled and sized to prevent condensation.

E. Lighting: Provide weather-resistant LED lighting with 30 fc (330 lx) average maintained.

F. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

G. Muffler Location: Within enclosure.

H. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.

I. Interior Lights with Switch: Factory-wired, vaporproof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.

1. AC lighting system and connection point for operation when remote source is available.

J. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.

2.10 VIBRATION ISOLATION DEVICES

A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.

1. Material: Standard neoprene separated by steel shims.

B. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.11 FINISHES

A. Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.12 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

B. Examine roughing-in for piping systems and electrical connections to verify actual locations of connections before packaged engine generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Architect no fewer than 10 working days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Architect's written permission.

3.3 INSTALLATION

A. Comply with NECA 1 and NECA 404.

B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.

C. Equipment Mounting:

1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

E. Gaseous Fuel Piping:

1. Natural gas piping, valves, and specialties for gas distribution are specified in Section 231123 "Facility Natural Gas Piping."

F. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

B. Gaseous Fuel Connections:

1. Connect fuel piping to engines with a gate valve and union and flexible connector.
2. Install manual shutoff valve in a remote location to isolate gaseous fuel supply to the generator.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.

E. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.5 IDENTIFICATION

A. Identify system components according to Section 230553 "Identification for HVAC Piping and Equipment" and Section 260553 "Identification for Electrical Systems."

B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.

    a. Visual and Mechanical Inspection:

        1) Compare equipment nameplate data with Drawings and the Specifications.
        2) Inspect physical and mechanical condition.
        3) Inspect anchorage, alignment, and grounding.
        4) Verify that the unit is clean.

    b. Electrical and Mechanical Tests:

        1) Test protective relay devices.
        2) Verify phase rotation, phasing, and synchronized operation as required by the application.
        3) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
        4) Conduct performance test according to NFPA 110.
        5) Verify correct functioning of the governor and regulator.

2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

C. Coordinate tests with tests for transfer switches and run them concurrently.

D. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.

E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Remove and replace malfunctioning units and reinspect as specified above.

I. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.

J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

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SECTION 26 36 00
TRANSFER SWITCHES

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 automatic and nonautomatic transfer switches rated 600 V and less, including the following:

1. Remote annunciator system.
2. Remote annunciator and control system.

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 transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, power sources, and load.
4. Riser Diagram: Show interconnection wiring between transfer switches, annunciators, and control panels.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

    a. Features and operating sequences, both automatic and manual.
    b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Architect no fewer than 10 days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Architect's written permission.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 24 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 110.

D. Comply with UL 1008 unless requirements of these Specifications are stricter.

E. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Short-time withstand capability for 30 cycles.

F. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

G. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

H. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

I. Neutral Switching: Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

J. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

K. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable shrinkable sleeve markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
4. Accessible via front access.

L. Enclosures: General-purpose NEMA 250, Type 1, complying UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

A. ASCO

B. Taylor Power Systems

C. Generac Power Systems

D. Caterpillar

E. Kohler Co.

F. Comply with Level 2 equipment according to NFPA 110.

G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Switch Action: Double throw; mechanically held in both directions.
2. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.

3. Conductor Connectors: Suitable for use with conductor material and sizes.
4. Material: Tin-plated aluminum.
5. Main and Neutral Lugs: Mechanical type.
6. Ground Lugs and Bus-Configured Terminators: Mechanical type.
7. Connectors shall be marked for conductor size and type according to UL 1008.

H. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.

1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.

I. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

J. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

K. Electric Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.

L. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval shall be adjustable from 1 to 30 seconds.

M. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

N. Automatic Transfer-Switch Controller Features:

1. Controller operates through a period of loss of control power.
2. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is unavailable.

2.3 TRANSFER SWITCH ACESSORIES

A. Remote Annunciator System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches.
3. Annunciation panel display shall include the following indicators:

    a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
    b. Switch position.
    c. Switch in test mode.
    d. Failure of communication link.

4. Annunciator Panel: LED-lamp type with audible signal and silencing switch.

    a. Indicating Lights: Grouped for each transfer switch monitored.
    b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
    c. Mounting: Flush, modular, steel cabinet unless otherwise indicated.
    d. Lamp Test: Push-to-test or lamp-test switch on front panel.

2.4 SOURCE QUALITY CONTROL

A. Prepare test and inspection reports.

1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:

    a. Overvoltage.
    b. Undervoltage.
    c. Loss of supply voltage.
    d. Reduction of supply voltage.
    e. Alternative supply voltage or frequency is at minimum acceptable values.
    f. Temperature rise.
    g. Dielectric voltage-withstand; before and after short-circuit test.
    h. Overload.
    i. Contact opening.
    j. Endurance.
    k. Short circuit.
    l. Short-time current capability.
    m. Receptacle withstand capability.
    n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Floor-Mounting Switch: Anchor to floor by bolting.

1. Install transfer switches on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
3. Provide workspace and clearances required by NFPA 70.

B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.

C. Identify components according to Section 260553 "Identification for Electrical Systems."

D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

E. Comply with NECA 1.

3.2 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

E. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."

F. Route and brace conductors according to manufacturer's written instructions and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.

G. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches (457 mm) in length.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:

    a. Compare equipment nameplate data with Drawings and Specifications.
    b. Inspect physical and mechanical condition.
    c. Inspect anchorage, alignment, grounding, and required clearances.
    d. Verify that the unit is clean.
    e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
    f. Verify that manual transfer warnings are attached and visible.
    g. Verify tightness of all control connections.
    h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

        1) Use of low-resistance ohmmeter.
        2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

    i. Perform manual transfer operation.
    j. Verify positive mechanical interlocking between normal and alternate sources.
    k. Perform visual and mechanical inspection of surge arresters.
    l. Inspect control power transformers.

        1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
        2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
        3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

3. Electrical Tests:

    a. Perform insulation-resistance tests on all control wiring with respect to ground.
    b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
    c. Verify settings and operation of control devices.
    d. Calibrate and set all relays and timers.
    e. Verify phase rotation, phasing, and synchronized operation.
    f. Perform automatic transfer tests.
    g. Verify correct operation and timing of the following functions:

        1) Normal source voltage-sensing and frequency-sensing relays.
        2) Engine start sequence.
        3) Time delay on transfer.
        4) Alternative source voltage-sensing and frequency-sensing relays.
        5) Automatic transfer operation.
        6) Interlocks and limit switch function.
        7) Time delay and retransfer on normal power restoration.
        8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

    a. Check for electrical continuity of circuits and for short circuits.
    b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    c. Verify that manual transfer warnings are properly placed.
    d. Perform manual transfer operation.

5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

    a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
    b. Simulate loss of phase-to-ground voltage for each phase of normal source.
    c. Verify time-delay settings.
    d. Verify pickup and dropout voltages by data readout or inspection of control settings.
    e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

C. Coordinate tests with tests of generator and run them concurrently.

D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

E. Transfer switches will be considered defective if they do not pass tests and inspections.

F. Remove and replace malfunctioning units and retest as specified above.

G. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.

C. Coordinate this training with that for generator equipment.

END OF SECTION 26 36 00

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SECTION 264313
SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Type 1 surge protective devices.
2. Type 2 surge protective devices.
3. Enclosures.
4. Conductors and cables.

B. Related Requirements:
1. Section 262416 "Panelboards" for integral SPDs installed by panelboard manufacturer.
2. Section 262726 "Wiring Devices" for integral SPDs installed by receptacle manufacturer.

1.2 DEFINITIONS

A. Nominal: Nominal discharge current.

B. MCOV: Maximum continuous operating voltage.

C. Mode(s), also Modes of Protection: air of electrical connections where the VPR applies.

D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

E. NRTL: Nationally recognized testing laboratory.

F. OCPD: Overcurrent protective device.

G. SCCR: Short-circuit current rating.

H. SPD: Surge protective device.

I. Type 1 SPDs: Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service disconnect overcurrent device.

J. Type 2 SPDs: Permanently connected SPDs intended for installation on the load side of the service disconnect overcurrent device, including SPDs located at the branch panel.

K. Type 3 SPDs: Point of utilization SPDs.

L. VPR: Voltage protection rating.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include electrical characteristics, specialties, and accessories for SPDs.
2. NRTL certification of compliance with UL 1449.

a. Tested values for VPRs.
b. Inominal ratings.
c. MCOV, type designations.
d. OCPD requirements.
e. Manufacturer's model number.
f. System voltage.
g. Modes of protection.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace SPDs that fail in materials or workmanship within five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TYPE 1 SURGE PROTECTIVE DEVICES (SPDs)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. APT, a division of Schneider Electric
2. SSI, an ILSCO Company
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. G.E., a division of ABB

B. Source Limitations: Obtain devices from single source from single manufacturer.

C. Standards:

1. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 1.

D. Product Options:

1. Include integral disconnect switch.
2. Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include indicator light display for protection status.
4. Include audible alarm.
5. Include NEMA ICS 5, dry Form C contacts rated at **2 A and 24 V ac** for remote monitoring of protection status.
6. Include surge counter.

E. Performance Criteria:

1. MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.
2. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than **200** kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.
3. Protection modes and UL 1449 VPR for grounded wye circuits with **480Y/277 V, 208Y/120 V**, three-phase, four-wire circuits must not exceed the following:

   a. Line to Neutral: **1200 V for 480Y/277 V, 700 V for 208Y/120 V**.
   b. Line to Line: **2000 V for 480Y/277 V, 1200 V for 208Y/120 V**.

4. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits must not exceed the following:

   a. Line to Neutral: 700 V.
   b. Line to Line: 1200 V.

5. SCCR: Not less than **200** kA.
6. Inominal Rating: 20 kA.

2.2 TYPE 2 SURGE PROTECTIVE DEVICES (SPDs)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. APT, a division of Schneider Electric
2. SSI, an ILSCO Company
3. Siemens Energy & Automation, Inc.
4. Eaton Corporation, Cutler-Hammer Products
5. G.E., a division of ABB

B. Source Limitations: Obtain devices from single source from single manufacturer.

C. Standards:

1. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 2.
2. Comply with UL 1283.

D. Product Options:

1. Include LED indicator lights for power and protection status.
2. Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include NEMA ICS 5, dry Form C contacts rated at **2 A and 24 V ac** for remote monitoring of protection status.
4. Include surge counter.

E. Performance Criteria:

1. MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.
2. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than **150** kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.
3. Protection modes and UL 1449 VPR for grounded wye circuits with **480Y/277 V or 208Y/120 V**, three-phase, four-wire circuits must not exceed the following:

    a. Line to Neutral: **1200 V for 480Y/277 V, 700 V for 208Y/120 V**.
    b. Line to Ground: **1200 V for 480Y/277 V, 700 V for 208Y/120 V**.
    c. Neutral to Ground: **1200 V for 480Y/277 V, 700 V for 208Y/120 V**.
    d. Line to Line: **2000 V for 480Y/277 V, 1200 V for 208Y/120 V**.

4. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits must not exceed the following:

    a. Line to Neutral: 700 V.
    b. Line to Ground: 700 V.
    c. Neutral to Ground: 700 V.
    d. Line to Line: 1200 V.

5. SCCR: Equal or exceed **200** kA.
6. Nominal Rating: **20** kA.

2.3 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, **Type 3R**.

2.4 CONDUCTORS AND CABLES

A. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Provide OCPD and disconnect for installation of SPD in accordance with UL 1449 and manufacturer's written instructions.

C. Install leads between disconnects and SPDs short, straight, twisted, and in accordance with manufacturer's written instructions. Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

1. Do not splice and extend SPD leads unless specifically permitted by manufacturer.
2. Do not exceed manufacturer's recommended lead length.
3. Do not bond neutral and ground.

D. Use crimped connectors and splices only. Wire nuts are unacceptable.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Compare equipment nameplate data for compliance with Drawings and the Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. SPDs that do not pass tests and inspections will be considered defective.

C. Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Complete startup checks in accordance with manufacturer's written instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.

C. Energize SPDs after power system has been energized, stabilized, and tested.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to operate and maintain SPDs.

END OF SECTION 264313

SECTION 265119
LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of LED luminaires:

1. Cylinder.
2. Downlight.
3. Linear industrial.
4. Recessed, linear.
5. Surface mount, linear.
6. Surface mount, nonlinear.
7. Suspended, linear.
8. Suspended, nonlinear.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

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. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
2. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

B. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.

1. Obtain Architect's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. 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. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: 41 to 104 deg F (5 to 40 deg C).

B. Altitude: Sea level to 1000 feet (300 m).

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp module characteristics:

a. Manufacturer

b. Model number

c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. Luminaire CRI requirements: Greater than 80 CRI unless noted otherwise on Drawings.

G. Luminaire CCT requirements: 4000K unless noted otherwise on Drawings.

H. Luminaire Lumen outputs: As indicated on Drawings or comparable with luminaire model specified on Drawings.

I. Luminaire Rated Lamp Life: As comparable with luminaire model specified on Drawings.

2.3 CYLINDER

A. Nominal Operating Voltage: s indicated on Drawings.

B. Housings: as indicated on the drawings

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.4 DOWNLIGHT

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. Recessed luminaires shall comply with NEMA LE 4.

2.5 LINEAR INDUSTRIAL

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.6 RECESSED, LINEAR

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. NEMA LE 4.

2.7 SURFACE MOUNT, LINEAR

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.8 SURFACE MOUNT, NONLINEAR

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are

designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.9 SUSPENDED, LINEAR

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.10 SUSPENDED, NONLINEAR

A. Nominal Operating Voltage: as indicated on Drawings.

B. Housings: as indicated on Drawings.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.

2.11 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.

C. Stainless Steel:

1. 1. Manufacturer's standard grade.
2. 2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209.

2.12 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.13 LUMINAIRE SUPPORT

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: Minimum 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

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 the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

D. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

E. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

F. Suspended Luminaires:

1. Pendants, Aircraft Cable and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

G. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

H. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

END OF SECTION 265119

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SECTION 265213
EMERGENCY AND EXIT LIGHTING

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. Exit signs.
   2. Luminaire supports.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.

D. Fixture: See "Luminaire" Paragraph.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support.

   1. Include data on features, accessories, and finishes.
   2. Include physical description of the unit and dimensions.
   3. Battery and charger for light units.

B. Shop Drawings: For nonstandard or custom luminaires.

   1. Include plans, elevations, sections, and mounting and attachment details.
   2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include diagrams for power, signal, and control wiring.

C. Product Schedule:

1. For emergency lighting units.
2. For exit signs.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and 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. Luminaire-mounted, emergency battery pack: One for every 50 emergency lighting units. Furnish at least one of each type.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.8 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five year(s) from date of Substantial Completion.

B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Power Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for the entire warranty period.
2. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for the entire warranty period.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

C. Comply with NFPA 70 and NFPA 101.

D. Comply with NEMA LE 4 for recessed luminaires.

2.2 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Operating at nominal voltage of 120 V ac or 277 V ac
2. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Housings:

1. As specified on the plans

D. Conduit: Electrical metallic tubing, minimum 3/4 inch (21 mm) in diameter.

2.4 METAL FINISHES

A. 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.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Support Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

3.5 STARTUP SERVICE

A. Perform startup service:

1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.

3.6 ADJUSTING

A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:

1. Inspect all luminaires. Replace lamps, emergency power units , batteries, signs, or luminaires that are defective.

a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

2. Conduct short-duration tests on all emergency lighting.

END OF SECTION 265213

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SECTION **270526**
GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding rods.
5. Grounding labeling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:

1. Ground rods.
2. Ground and roof rings.
3. BCT, TMGB, TGBs, and routing of their bonding conductors.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Installation Supervision: Installation shall be under the direct supervision of ITS Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
2. Field Inspector: Currently registered by BICSI as a designer RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

C. Comply with TIA-607-B.

2.2 CONDUCTORS

A. Comply with UL 486A-486B.

B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
2. Cable Tray Equipment Grounding Wire: No. 8 AWG.

C. Bare Copper Conductors:

1. Solid Conductors: ASTM B3.
2. Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.
4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

1. Electroplated tinned copper, C and H shaped.

C. Busbar Connectors: Cast silicon bronze, solderless compression-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. TMGB: Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with TIA-607-B.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide a 4-inch (100-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

B. TGB: Predrilled rectangular bars of hard-drawn solid copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, length as indicated on Drawings. The busbar shall be for wall mounting, shall be NRTL listed as complying with UL 467, and shall comply with TIA-607-B.

1. Predrilling shall be with holes for use with lugs specified in this Section.
2. Mounting Hardware: Stand-off brackets that provide at least a 2-inch (50-mm) clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

C. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-607-B. Predrilling shall be with holes for use with lugs specified in this Section.

1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.
2. Rack-Mounted Horizontal Busbar: Designed for mounting in 19- or 23-inch (483- or 584-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
3. Rack-Mounted Vertical Busbar: 72 or 36 inches (1827 or 914 mm) long, with stainless-steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

2.6 IDENTIFICATION

A. Comply with requirements for identification products in Section 270553 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the ac grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with TIA-607-B.

3.3 APPLICATION

A. Conductors: Install solid conductor for No. 8AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2 AWG minimum.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

D. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm).

E. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch (900-mm) intervals.
4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.

    a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

A. The BCT between the TMGB and the ac service equipment ground shall not be smaller than No. 1/0 AWG.

3.5 GROUNDING BUSBARS

A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 12 inches (300 mm) above finished floor unless otherwise indicated.

B. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

1. Use crimping tool and the die specific to the connector.
2. Pretwist the conductor.
3. Apply an antioxidant compound to all bolted and compression connections.

D. Primary Protector: Bond to the TMGB with insulated bonding conductor.

E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding

equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG unless otherwise indicated.

F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install vertically mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.

I. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.7 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.

1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.

a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and in each TGB. Maximum acceptable ac current level is 1 A.

C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 270526

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SECTION **271100**
COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backboards.
2. Boxes, enclosures, and cabinets.
3. Power strips.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

PART 2 - PRODUCTS

2.1 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

B. Backboard Paint: Light-colored fire-retardant paint.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets shall be listed and labeled for intended location and use.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, Type FD, aluminum, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized cast iron with gasketed cover.

G. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

H. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

2.3 POWER STRIPS

A. Comply with requirements in Section 271116 "Communications Racks, Frames, and Enclosures."

B. Power Strips: Comply with UL 1363.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Rack mounting, with detachable flanges.
3. Height: 2 RU.
4. Six 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.
5. Rear-facing receptacles.
6. LED indicator lights for power and protection status.
7. LED indicator lights for reverse polarity and open outlet ground.
8. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
9. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
10. Cord connected with 15-foot (4.5-m) line cord.
11. Rocker-type on-off switch, illuminated when in on position.
12. Surge Protection: UL 1449, Type 3.

a. Maximum Surge Current, Line to Neutral: 27 kA.
b. Protection modes shall be line to neutral, line to ground, and neutral to ground.
c. UL 1449 Voltage Protection Rating for line to neutral and line to ground shall be 600 V and 500 V for neutral to ground.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI's "Telecommunications Distribution Methods Manual" for layout of communications equipment spaces.

C. Comply with BICSI's "Information Technology Systems Installation Methods Manual" for installation of equipment in communications equipment spaces.

D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Coordinate layout and installation of communications equipment in tracks and in room. Coordinate service entrance configuration with service provider.

F. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

G. Backboards:

1. Install from 6 inches (150 mm) to 8 feet, 6 inches (2588 mm) above finished floor. If plywood is fire rated, ensure that fire-rating stamp is visible after installation.
2. Paint all sides of backboard with two coats of paint, leaving fire rating stamp visible.
3. Comply with requirements for backboard installation in BICSI's "Information Technology Systems Installation Methods Manual" and TIA-569-D.

3.2 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI's "Information Technology Systems Installation Methods Manual", "Firestopping Practices" Ch.

END OF SECTION 271100

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SECTION **271116**
COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. 19-inch equipment racks.
2. Power strips.
3. Grounding.
4. Labeling.

1.2 DEFINITIONS

A. Access Provider: An operator that provides a circuit path or facility between the service provider and user. An access provider can also be a service provider.

B. Service Provider: The operator of a telecommunications transmission service delivered through access provider facilities.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications racks, frames, and enclosures. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of TGB and its mounting detail showing standoff insulators and wall-mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings shall be under direct supervision of RCDD.
2. Installation Supervision: Installation shall be under direct supervision of Installer 2, Copper or Fiber, who shall be present at all times when Work of this Section is performed at Project site.
3. Field Inspector: Currently registered by BICSI as Technician to perform on-site inspection.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. UL listed.

B. RoHS compliant.

C. Compliant with requirements of the Payment Card Industry Data Security Standard.

2.2 19-INCH EQUIPMENT RACKS

A. Description: Two- post racks with threaded rails designed for mounting telecommunications equipment. Width is compatible with EIA/ECIA 310-E, 19-inch (482.6-mm) equipment mounting with an opening of 17.72-inches (450-mm) between rails.

B. General Requirements:

1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Material: Extruded steel.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: White.

C. Floor-Mounted Racks:

1. Overall Height: 84 inches (2133.6 mm) or as indicated on Drawings.
2. Overall Depth: 23 inches (584.2 mm).
3. Two-Post Load Rating: 400 lb (181 kg).
4. Four-Post Load Rating: 1000 lb (454 kg)."Numbering" Subparagraph below may describe a feature not available from all manufacturers.
5. Numbering: Every five rack units, on interior of rack.
6. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip.
7. Base shall have a minimum of four mounting holes for permanent attachment to floor.
8. Top shall have provisions for attaching to cable tray or ceiling.
9. Self-leveling.

D. Cable Management:

1. Metal, with integral wire retaining fingers.

2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.3 19-INCH EQUIPMENT CABINETS

A. Description: Manufacturer-assembled four-post frame enclosed by side and top panels and front and rear doors, designed for mounting telecommunications equipment. Width is compatible with EIA/ECIA 310-E, 19-inch (482.6-mm) equipment mounting with an opening of 17.72 inches (450 mm) between rails.

B. General Cabinet Requirements:

1. Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Material: Extruded steel.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: White.

C. Modular Freestanding Cabinets:

1. Overall Height: 84 inches (2133.6 mm) or as indicated on Drawings.
2. Overall Depth: 29 inches (736.6 mm).
3. Load Rating: 3000 lb (1362 kg).
4. Numbering: Every five rack units, on interior of rack.
5. Removable and lockable side and top panels.
6. Hinged and lockable front and rear doors.
7. Adjustable feet for leveling.
8. Screened ventilation openings in roof and rear door.
9. Cable access provisions in roof and base.
10. TGB.
11. Roof-mounted, 550-cfm (260-L/s) fan with filter.
12. Power strip.
13. All cabinets keyed alike.

D. Cable Management:

1. Metal, with integral wire retaining fingers.
2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at top of each relay rack, with a minimum height of two rack units each.

2.4 POWER STRIPS

A. Power Strips: Comply with UL 1363.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Rack mounting, with detachable flanges.
3. Six, 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.
4. Front-facing receptacles.
5. LED indicator lights for power and protection status.
6. LED indicator lights for reverse polarity and open outlet ground.
7. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
8. Cord connected with 15-foot (4.5-m) line cord.
9. Rocker-type on-off switch, illuminated when in on position.
10. Surge Protection: UL 1449, Type 3.

    a. Maximum Surge Current, Line to Neutral: 27 kA.
    b. Protection modes shall be line to neutral, line to ground, and neutral to ground.
    c. UL 1449 Voltage Protection Rating for line to neutral and line to ground shall be 600 V and 500 V for neutral to ground.

2.5 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Rack and Cabinet TGBs: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-606-B. Predrilling shall be with holes for use with lugs specified in this Section.

1. Cabinet-Mounted TGB: Terminal block, with stainless-steel or copper-plated hardware for attachment to cabinet.
2. Rack-Mounted Horizontal TGB: Designed for mounting in 19- or 23-inch (482.6- or 584.2-mm) equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
3. Rack-Mounted Vertical TGB: 72 or 36 inches (1828.8 or 914.4 mm) long, with stainless-steel or copper-plated hardware for attachment to rack.

2.6 LABELING

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout of communications equipment spaces.

C. Comply with BICSI ITSIMM for installation of communications equipment spaces.

D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

E. Coordinate layout and installation of communications equipment in racks and room. Coordinate service entrance configuration with service provider.

1. Meet jointly with system providers, equipment suppliers, and Owner to exchange information and agree on details of equipment configurations and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust configurations and locations of distribution frames, cross-connects, and patch panels in equipment spaces to accommodate and optimize configuration and space requirements of telecommunications equipment.
4. Adjust configurations and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in equipment room.

F. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.2 GROUNDING

A. Comply with NECA/BICSI 607.

B. Install grounding according to BICSI ITSIMM, "Bonding, Grounding (Earthing) and Electrical Protection" Ch.

C. Locate TGB to minimize length of bonding conductors. Fasten to wall, allowing at least 2 inches (50 mm) of clearance behind TGB. Connect TGB with a minimum No. 4 AWG grounding electrode conductor from TGB to suitable electrical building ground. Connect rack TGB to near TGB or the TMGB.

1. Bond the shield of shielded cable to patch panel, and bond patch panel to TGB or TMGB.

D. Labels shall be machine printed. Type shall be [1/8 inch (3 mm)] [3/16 inch (5 mm)] [1/4 inch (6 mm)] in height.

END OF SECTION 271116

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SECTION **271513**
COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Category 6a twisted pair cable.
2. Twisted pair cable hardware, including plugs and jacks.
3. Cable management system.
4. Grounding provisions for twisted pair cable.

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

A. Horizontal cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the equipment outlets to the station equipment.

C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Reviewed and stamped by RCDD.

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration Drawings and printouts.
4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment.

C. Twisted pair cable testing plan.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For RCDD, installation supervisor, and field inspector.

B. Product Certificates: For each type of product.

C. Source quality-control reports.

D. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On USB media.
3. Device address list.
4. Printout of software application and graphic screens.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings and cabling administration Drawings by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.

1.7 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.8 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, provide software support for two years.

B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.

C. Grounding: Comply with TIA-607-B.

2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:

1. Communications, Plenum Rated: Type CMP complying with UL 1685.
2. Communications, Plenum Rated: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
3. Communications, Non-plenum: Type CMR complying with UL 1666.
4. Communications, Non-plenum: Type CMP or Type CMR in listed plenum or riser communications raceway.
5. Communications, Non-plenum: Type CMP or Type CMR in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

C. RoHS compliant.

2.3 CATEGORY 6a TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500MHz.

B. Standard: Comply with TIA-568-C.2 for Category 6a cables.

C. Conductors: 100-ohm, 23 AWG solid copper.

D. Shielding/Screening: Unshielded twisted pairs (UTP).

E. Jacket: Color as indicated on Drawings thermoplastic.

2.4 TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.

B. General Requirements for Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 6a.
2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.

C. Source Limitations: Obtain twisted pair cable hardware from same manufacturer as twisted pair cable, from single source.

D. Connecting Blocks:
1. 110-style IDC for Category 6a.
2. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.

E. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.

1. Number of Terminals per Field: One for each conductor in assigned cables.

F. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

a. Universal T568A and T568B wiring labels.
b. Labeling areas adjacent to conductors.
c. Replaceable connectors.
d. 24 or 48 ports.

2. Construction: 16-gauge steel and mountable on 19-inch (483 mm) equipment racks.

G. Patch Cords: Factory-made, four-pair cables in 36” to 60” lengths as required; terminated with an eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.

H. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Standard: Comply with TIA-568-C.2.
3. Marked to indicate transmission performance.

I. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standard: Comply with TIA-568-C.2.
4. Marked to indicate transmission performance.

J. Faceplate:

1. Four port, vertical single gang faceplates designed to mount to single gang wall boxes.
2. Eight port, vertical double gang faceplates designed to mount to double gang wall boxes.
3. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
4. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.

a. Flush mounting jacks, positioning the cord at a 45-degree angle.

K. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.5 CABLE MANAGEMENT SYSTEM

A. Description: Computer-based cable management system, with integrated database capabilities.

B. Document physical characteristics by recording the network, TIA details, and connections between equipment and cable.

C. Information shall be presented in database view.

1. Microsoft Visio Professional or AutoCAD drawing software shall be used as drawing and schematic plans software.

D. System shall interface with the following testing and recording devices:

1. Direct upload tests from circuit testing instrument into the personal computer.
2. Direct download circuit labeling into labeling printer.

2.6 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with TIA-607-B.

PART 3 - EXECUTION

3.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and NECA/BICSI 568.

B. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Section 270528 "Pathways for Communications Systems."

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

D. General Requirements for Cabling:

1. Comply with TIA-568-C.1.
2. Comply with BICSI's Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Do not untwist twisted pair cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.

9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

3.2 FIRESTOPPING

A. Comply with requirements in Section 078413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.3 GROUNDING

A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."

B. Comply with TIA-607-B and NECA/BICSI-607.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.

D. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

E. Equipment grounding conductors.

F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
    b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-B requirements for the following:

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

C. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.

D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

END OF SECTION 271513

SECTION 281300
INTEGRATED ACCESS CONTROL AND SECURITY MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide a modular and network-enabled access control system for security management, including engineering, supply, installation, and activation.

1.2 REFERENCES

A. Reference Standards: Systems specified in this Section shall meet or exceed the requirements of the following:

1. Federal Communications Commission (FCC):

a. FCC Part 15 – Radio Frequency Device

b. FCC Part 68 – Connection of Terminal Equipment to the Telephone Network

2. Underwriters Laboratories (UL):

a. UL294 – Access Control System Units

b. UL1076 – Proprietary Burglar Alarm Units and Systems

3. National Fire Protection Association (NFPA):

a. NFPA70 – National Electrical Code

4. Electronic Industries Alliance (EIA):

a. RS232C – Interface between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange

b. RS485 – Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multi-Point Systems

5. Federal Information Processing Standards (FIPS):

a. Advanced Encryption Standard (AES) (FIPS 197)

b. FIPS 201: Personal Identity Verification (PIV) of Federal Employees and Contractors

6. Homeland Security Presidential Directive 12 (HSPD-12)

1.3 INTEGRATED SECURITY MANAGEMENT SYSTEM DESCRIPTION

A. The Integrated Security Management System (ISMS) shall function as an electronic access control system and shall integrate the alarm monitoring, CCTV, digital video, ID badging and database management into a single platform. ISMS shall function as a one-stop gateway for all the access control needs. A modular and network-enabled architecture shall allow

maximum versatility for tailoring secure and dependable access and alarm monitoring solutions.

1.4 SUBMITTALS

A. Manufacturer's Product Data: Submit manufacturer's data sheets indicating systems and components proposed for use.

B. Shop Drawings: Submit complete shop drawings indicating system components, wiring diagrams and load calculations.

C. Record Drawings: During construction maintain record drawings indicating location of equipment and wiring. Submit an electronic version of record drawings for the Security Management System not later than Substantial Completion of the project.

D. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data, customized to the Security Management System installed. Include system and operator manuals.

E. Maintenance Service Agreement: Submit a sample copy of the manufacturer's maintenance service agreement, including cost and services for two years, for the Owner's review.

1.5 QUALITY ASSURANCE

A. Manufacturer: A minimum of ten years of experience in manufacturing and maintaining Security Management Systems. Manufacturer shall be Microsoft Gold Certified.

B. The Installer must be certified by Honeywell Integrated Security Dealer Service Certification Program (DSCP).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's labeled packages. Store and handle in accordance with the manufacturer's requirements.

1.7 WARRANTY

A. Manufacturer's Warranty: Submit manufacturer's standard warranty for the security management system.

1.8 DEFINITIONS

A. Access Card: A coded employee card, usually the size of a credit card, recognizable to the access control system and read by a reader to allow access. It can be used for photo identification of the cardholder and for other data collection purposes. Card technologies include magnetic strips, Wiegand-effect, proximity (active/passive), barium ferrite, smart/intelligent cards and mobile credentials (smart phone with a credential/app).

B. Abstract Device: An Abstract Device (ADV) is a logical representation of a physical device. The ADVs can be associated with any hardware device, including communication interfaces,

panels, alarm points, entrances, and CCTV equipment. The ADVs help in monitoring the device status and controlling the actions of a physical device through the Control Map, Floor Plan, or Alarm View.

C. Access Control System: An interconnected set of controllers, managing the entrance and exit of people through secure areas.

D. WIN-PAK Web: The WIN-PAK Web application is an extension of the WIN-PAK host application with limited operations. The day-to-day operations such as Card/User management, Reports, Door control, Schedules, viewing live card event activities that are common to both WIN-PAK host and WIN-PAK Web application are saved on a common database server. The WIN-PAK Web UI works using the WIN-PAK Web server.

E. Access Level: The door or combination of doors and/or barriers an individual is authorized to pass through.

F. Anti-Pass back (Anti-Tailgating): This feature protects against more than one person using the same card or number. It defines each system card reader and card ID number as IN, OUT or other. Once a card is granted access to an IN reader, it must be presented to an OUT reader before another IN reader access is granted. Cards will continue to have access to all authorized OTHER readers.

G. Alarm: A signal that indicates a problem.

H. Alarm input: A device that is monitored by the access control panel. An alarm signal will be generated if the device is activated.

I. Badge: Badge is a template or a design for creating a card. WIN-PAK includes a full-featured badge layout utility for designing, creating, and printing badges. Badge design includes magnetic stripe encoding, bar coding, signatures, and so on.

J. Bar Code: A method of encoding information using lines and blank spaces of varying size and thickness to represent alphanumeric characters.

K. Biometrics: A general term for the verification of individuals using unique biological characteristics (i.e. fingerprints, hand geometry, voice analysis, the retinal pattern in the eye).

L. Card and Card Holder: A card is an identity proof of a person and a card holder is a person who holds the card. Multiple cards can be assigned to a single card holder to provide different access.

M. Controller: A microprocessor based circuit board that manages access to a secure area. The controller receives information that it uses to determine through which doors and at what times cardholders are granted access to secure areas. Based on that information, the controller can lock/unlock doors, sound alarms, and communicate status to a host computer.

N. Communication Port: A hardware device that allows a computer to communicate with external devices.

O. Card Reader: A device that retrieves information stored on an access card and transmits that information to a controller.

P. Digital Video Recorder (DVR): A security system device that records the video from the surveillance cameras (IP and Analog) on a hard disk.

Q. Door: A generic term for a securable entry way. In many access control applications, a "door" may be a gate, turnstile, elevator door, or similar device.

R. Duress: Forcing a person to provide access to a secure area against that person's wishes.

S. Guard Tour: A defined route of a security guard.

T. Host Computer: The central controlling computer from which access control software applications are run.

U. Input: An electronic sensor on a controller that detects a change of state in a device outside the controller.

V. Keypad: An alphanumeric grid which allows a user to enter an identification code. A flat device which has buttons that may be pressed in a sequence to send data to a controller, and which differs from a typewriter-like computer board.

W. Online Help: A reference program within most software programs that provides basic descriptions and instructions on how to use that software program.

X. Output Relay: A device that changes its state upon receiving a signal from a controller. Typically, the state change prompts an action outside of the controller such as activating or inactivating a device. The auxiliary relays found in access control panels or NODES that control external devices.

Y. Reader: A device that "receives" an identification code from a card, key tag, magnetic stripe card, bar code card, or related item. Refers to the “front end” that a user must interact with to allow access. Readers can be keypads, card readers, proximity readers, and so on.

Z. RS232: A serial communication protocol used for connecting data terminal devices. RS-232 is the most commonly used communication protocol.

AA. Server: The host computer, which has the ISMS functions.

BB. Shunt Time: The length of time a door open alarm is suppressed (shunted) after a valid card access or free egress request. This time should be just enough to allow a card user to open a door or gate, pass through, and then close it.

CC. Time zones: "Schedules" that allow cards to function or not function depending on the time of day. This is used to limit access to the facility. The schedule may include not only time but which days of the week a card is valid.

DD. Wiegand Card: An access control card based on the Wiegand effect. Small bits of specially processed wire are embedded in the card in a pattern that uniquely identifies the card. This identification information can then be decoded by a Wiegand reader.

EE. Wiegand Reader: A reader capable of reading the information encoded on a Wiegand card.

FF. Video Management System (VMS): An enterprise-class video management and storage solution.

PART 2 PRODUCTS

2.1 MANUFACTURER

1. Honeywell
2. Johnson Controls
3. Bosch

2.2 ISMS COMPONENTS

The ISMS shall be divided into six components: Database Server, Archive Server, Communication Server, User Interface, WIN-PAK API Server, and WIN-PAK Web. These components shall run on a single computer or on multiple computers, allowing flexibility in configuring a networked system.

a. Database Server: The database server is used for storing the database tables. This data is accessible to communication server and user interface for retrieving and generating the reports. The database server shall be installed on the client computer or any other computer connected to the network.

b. Archive Server: The archive server is used to obtain data from the archive database (the archive database consists of the backup details of the WINPAK main database).

c. Communication Server: The communication server routes user interface requests as well as the access transactions to the panel. The panel in-turn processes the transactions and sends the information to the database server as well as responses to the user interface through the communication server. When the communication server is sending information to the database server, it can also receive a request from the user interface. In this scenario, the communication server considers the user request as a higher priority and stops the panel-database server communication until the user request is processed. The communication server shall be installed on the client computer or any other computer connected to the network.

d. User Interface (ISMS Client): The user interface helps ISMS operators to communicate with the access control system. The user interface shall be installed on the computer where the database server or the communication server is installed or any other computer connected to the network. Several client computers can be run simultaneously and can access the single database server simultaneously. The number of client computers varies based on the licensing information of ISMS.

e. WIN-PAK API Server: The API server is used to obtain and set the details in the WIN-PAK database using the Application Programming Interface (API).

f. WIN-PAK Web: The WIN-PAK Web application is an extension of the WIN-PAK host application with limited operations. The operations such as Adding Cards, and Adding Card Holders that are common to both WIN-PAK host and WIN-PAK Web application are saved on a common database server.

In addition to above six components, ISMS include the following four components, also called as ISMS services.

g. Command File Server: A command file server provides text files containing device instructions that shall be stored in the command files database. The commands in the command files can be sent to the devices automatically on receiving, acknowledging, or clearing an alarm. Also, the command files can be manually executed.

h. Guard Tour server: A guard tour is a defined series of check points a guard must activate within a given amount of time. The check points are readers or input points where the guard presents the card or presses the button.

i. Tracking and Muster Server: A muster server is enabled in the event of an emergency and allows the card holders to swipe the readers. Muster areas are logical areas that contain readers to be used by the card holders, only if there is a call for muster (in the event of a disaster, for example).

j. Schedule Server: A schedule server schedules the list of events to be performed at a predetermined time and intervals such as hourly, daily, or monthly.

k. Video Management Server: A video management server provides interface to connect to various DVR's/NVR's. In addition, it also provides CCTV control with live monitor display, PTZ control of cameras, video playback operations, and so on.

2.3 INTEGRATED SECURITY MANAGEMENT SYSTEM OPERATIONAL REQUIREMENTS

A. The ISMS shall be a modular and network-enabled access control system capable of controlling multiple remote sites, alarm monitoring, video imaging, ID badging, mobile credential provisioning, paging, digital video and CCTV switching and control that allows for easy expansion or modification of inputs and remote-control stations. The ISMS control at a central computer location shall be under the control of a single software program and shall provide full integration of all components. It shall be alterable at any time depending upon facility requirements. The ISMS reconfiguration shall be accomplished online through system programming.

The ISMS shall include the following features:

1. Multi-User/Network Capabilities: The ISMS shall support multiple operator workstations via local area network/wide area network (LAN/WAN). The communications between the workstations and the server computer shall utilize the TCP/IP standard over industry standard IEEE 802.3 (Ethernet). The communications between the server and workstations shall be supervised, and shall automatically generate alarm messages when the server is unable to communicate with a workstation. The operators on the network server shall have the capability to log on to workstations and remotely configure the devices for the workstation. Standard operator permission levels shall be enforced, with full operator audit.

2. Operating Environment: The ISMS shall be a true 32-bit or 64-bit, 3-tier client/server, ODBC compliant application based on Microsoft tools and standards. The ISMS application shall operate in the following environments: Microsoft Windows® Server 2016, Windows Server 2012 R2, Windows 10 Professional and Windows 8.1 Professional; Windows 7 SP1 (64-bit) for workstations only.

3. WIN-PAK Web: Using the Web interface, any operator from any customer location can access the WIN-PAK database server from any computer on the network. The operators at the customer sites must be granted appropriate access rights for accessing the WIN-PAK database server through the Web interface. These access rights are granted by the WIN-PAK Administrator using the WIN-PAK host application.

4. Multiple Servers: The ISMS shall consist of multiple servers including, but not limited to, database server, communications server, and client workstation. The servers shall be capable of being installed on one or more computers across a network providing a distribution of system activities and processes. The ISMS shall support multiple communication servers on a LAN/WAN, to provide distributed networking capabilities, which significantly improve system performance.

5. Multi-level Password Protection: The ISMS application shall provide multi-level password protection, with user-defined operator name/password combinations. Name/password log-on shall restrict operators to selected areas of the program. The application shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change, or delete.

6. Graphical User Interface: The ISMS shall be fully compliant with Microsoft Graphical User Interface (GUI) standards, with the look and feel of the software being that of a standard Windows application, including hardware tree-based system configuration.

7. Online Help: The ISMS user interface shall include an Online Help which shall require only one click to activate. The standard special function key “F1” shall have the capability to be programmed to provide access to the help system.

8. Guard Tour: The Security Management System shall include a guard tour module, which shall allow the users to program guard tours for their facility. The tours shall not require the need for independent or dedicated readers.

9. Concurrent Licensing: The ISMS shall support concurrent client workstation licensing. The ISMS application shall be installed on any number of client workstations, and shall provide the ability for any of the client workstations to connect to the database server if the maximum number of concurrent connections purchased has not been exceeded.

10. Concurrent browser connections: a minimum of 100 concurrent web connections shall be included as standard to manage day-to-day access control tasks including but not limited to: Card and Cardholder (Names, Notes fields, Note Field creation and Note Field templates); Badge Printing; Door Schedules; Lock Control; Panic Door control; Schedules; Holidays; Access Level; Reports; Report Templates and Schedules; Messaging, viewing live card activities and Locate functions.

11. WIN-PAK supports multiple installation types.

    a. Single Server Deployment: Installs all the WIN-PAK components such as client, server, web, API, VMS, and support programs.

    b. Dual Server Deployment: The dual server deployment is hosted on two computers. The first computer, server 1, will have the complete host, API, and the VMS installed. The second computer, server 2, will have the host User Interface, Remote communication server, VMS, and Web installed.

12. Relational Database Management System: The Security Management System shall support industry standard relational database management systems. This shall include relational database management system Microsoft SQL Server 2014 Enterprise Edition. The RDBMS shall provide edit, add, delete, search, sort, and print options for records in the selected databases.

13. Database Partitioning: The Security Management System shall provide the option to restrict access to sensitive information by user ID.

14. Unicode: The Security Management System shall utilize Unicode worldwide character set standard. The Security Management System shall support double-byte character sets to facilitate adaptation of the Security Management System user interface and documentation to new international markets. Language support shall include at a minimum English and French.

15. Encryption: The Security Management System shall provide multiple levels of data encryption.

    a. True 128-bit AES data encryption between the host and intelligent controllers. The encryption shall ensure data integrity that is compliant with the requirements of FIPS-197 and SCIF environments. Master keys shall be downloaded to the intelligent controller, which shall then be authenticated through the Security Management System based on a successful match.

    b. Transparent database encryption, including log files and backups.

c. SQL secure connections via SSL.

d. Asymmetric Column level encryption is used for personal data fields in the SQL data fields.

16. Industry Standard Panel Communication: The ISMS application shall communicate with the access control panels via LAN/WAN connections utilizing industry standard communication protocols.

17. Supervised Alarm Points: The system shall provide both supervised and non-supervised alarm point monitoring. On recognition of an alarm, the system shall can switch and displaying the video from the camera connected to the digital video recorder that is associated with the alarm point.

18. Multiple Account Support: The ISMS application shall allow support for multiple accounts allowing separate access to the card database, badge layout, operator access, and reporting. Physical hardware may be filtered by operator level into sites. Sites may reside in multiple accounts.

19. Logical Representation of Hardware Devices: The ISMS shall use Abstract Devices (ADV) for representing physical hardware devices in the system. The ADVs shall be used in Floor Plans to provide the user interface to control and monitor the system, and shall also be used in the data trees to organize, display, and control system information.

20. Access Control Functions: The ISMS shall include the following access control functions: validation based on time of day, day of week, holiday scheduling, site code and card number verification, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card, card and PIN, card or pin, pin only and Site Code only.

21. Digital Video Recorders (DVRs) Support: The ISMS shall support the RapidEye, Fusion, MAXPRO NVR, HRDP and Performance Series DVRs.

22. Camera Functions: The ISMS shall include the following camera functions: pan/tilt, lens control, limits, and home.

23. Live Video Display: The ISMS shall provide an option to view live video from a camera connected to the digital video recorder on the computer screen. The live video window shall allow the user to change its size and location on the computer screen. Video controls (pan, tilt, zoom) shall be available to customize the display of live video to the user's requirements.

24. Global and Local Anti-passback: The Security Management System shall support the use of an optional anti-passback mode, in which cardholders are required to follow a proper in/out sequence within the assigned area.

25. Alarm Events: The ISMS shall include a feature where alarm events with defined priorities pop-up automatically in an Alarm event window for operator attention. The

pop-up shall display the name of the event (reader, alarm point, cardholder, or system alarm), time, date, site, account. In a card event, the card number, type of event and cardholder name is displayed. An event counter shall also display the number of times the event was reported to the Alarm event monitor prior to Acknowledgement or Clearing the event. Event instructions shall be made available by double clicking on the event. The event shall also display an icon to indicate that video is available for events so programmed. The Alarm event window shall allow the operator to initiate a physical response to the event as well as a written response. Responses shall include but not be limited to: acknowledge, clear, open a pre-programmed floor plan, energize, de-energize, pulse, time pulse, add comment, retrieve event video, and bring up live video, shunt, or un-shunt.

26. Manual Panel Control: The ISMS application shall allow manual control of selected inputs, outputs, and groups of outputs. Manual panel control shall include pulse, timed pulse, and energize/de-energize or return to time zone options for output points and shunt/unshunt or return to time zone options for input points. For entrances and readers manual control shall include but be limited to Lock, Un-Lock, Disable, Card only, Card-Pin only, Pin only, exit only and site code only. For partitions monitored by the intrusion panel the control shall include but not be limited to arm away, arm stay, disarm, refresh, and provide a virtual keypad for the partition. For zones monitored by the intrusion panel the control shall include but not be limited to bypass, unbypass, and refresh. Intrusion panel output control shall include activate, deactivate and refresh.

27. Levels of System Operation: The ISMS shall include a feature to define the levels of system operation for each individual operator using passwords. System operation for individual operators shall include, but not be limited to, restricted time periods for login, available accounts and default language selection at login. Operator actions range from no view or control rights to basic monitoring including the ability to block the viewing of card and or personal identification numbers, to full control of the system including programming.

28. Hardware Configuration Changes: After installation of ISMS application, the customer shall be able to perform hardware configuration changes. These hardware configuration changes shall include, but not be limited to, door open time, door contact shunt time, point and reader names, when and where a cardholder is valid, and the ability to add or modify card databases as desired; For the intrusion system, any function that can be programmed from a physical keypad shall also be available from the system's virtual keypad, without the services of the Contractor or Manufacturer.

29. Distributed Processing: All the control components of the ISMS shall utilize "Distributed-Processing" concepts. The distributed processing shall include the ability to download operating parameters to any field panel, thus allowing the field panel to provide full operating functions independent of the access control system computer.

30. Flexible Component replacement: The repair of hardware components associated to the ISMS shall be accomplished on site, by a new replacement, utilizing spare components.

B. The ISMS application shall have the major functional capabilities (considered essential for the system described in this specification) categorized as follows:

1. General

a. All the databases shall have the ability to add, delete, report, view, and edit information.

b. All the system transactions shall be saved in a retrievable file.

c. All the events shall be logged by date and time.

d. All the system transactions or selected system transactions shall be saved in a disk file.

e. The end-user shall have the provision to make any system configuration changes such as, but not limited to door open time, door contact shunt time, point and reader names, when and where a cardholder is valid, and the ability to add or modify card databases at any time.

f. Shall support “Global Anti-pass back”, feature allowing cardholder to enter/exit any such defined card reader on the same intelligent control panel or RS-485 drop-line consisting of 2 and 4 door controllers.

g. Anti-pass back modes shall include: hard (no forgiveness), soft (allows access but generates an alarm event) and timed for all readers on the intelligent controller, on specified reader or card for a definable period of time up to 32,000 seconds.

h. Shall support the “Duress” feature, where a PIN is used in conjunction with a card read; the numbers of digits are selected using the keypad where the PIN number is a value different from the normal PIN.

i. Shall support the “Two card holder” rule, where two valid, non-identical “cards” must be used within a 20 second period to grant access.

j. Shall have the option to display the time when a card holder using a reader has accessed (opened) the door or the card was used, but the door was not opened.

k. Shall support the “Latch mode” operation where the first card read unlocks the door and the second card read locks it.

l. Shall provide a mode of system operation that stores system commands not accepted by the hardware.

m. Shall provide a mode of system operation that requires the operator to enter a response to an event when acknowledging it from the alarm view window.

n. Shall provide a mode of system operation that allows acknowledged alarms to be automatically cleared.

o. Shall provide a mode of system operation where when an acknowledged, but not cleared event will be reissued requiring acknowledgement when the event changes to an alarm or trouble state.

p. Shall provide a mode of system operation that does not allow the operator to clear an alarm before prior to it being restored to normal.

q. Shall provide the ability for manual operator control of system output relays. The manual functions shall include the ability to energize, de-energize, return to time zone, or pulse the output relay. The pulse time shall be a programmable setting.

r. Shall provide the ability for manual operator control of system doors. The manual functions shall include the ability to Lock, Un-Lock, Disable, Card only, Card-Pin only, Pin only, exit only and site code only.

s. Shall provide the ability to automatically display stored “video image” of cardholder, and switch real-time camera from CCTV or digital video server to card reader location for specific card usage.

t. The cardholder “video image” pop-up shall be activated based on a priority level set to the cardholder or reader. Information in the pop-up shall include, but not be limited to the card holder’s primary image a live video pop-up showing the person who initiated the pop-up, entrance name, time, date, cardholder name, and status. User shall be able to display up to 40 note fields. The size of the pop-ups shall be adjustable by the operator.

u. Shall support multiple card reader technology including: Proximity, Wiegand effect, Biometrics, Magnetic stripe, Bar Code, Keypad, Card/keypad (PIN), High-speed long-range Vehicle ID, Smart Card and mobile credentials (smart phone with a credential/app).

v. Shall provide an option for taking scheduled automatic backups of any or all database system files. A means to restore these files from a simple menu shall exist.

w. Shall provide the ability to address up to 255 serial communication ports per communication server, where each port can be configured for either hardwired, or dial-up. When configured for dial-up, any one port can support multiple dial-up locations.

x. Communication from the access control communication server to the remote intelligent control panels shall be selectable. Communication options shall be

RS-232 directly to the intelligent control, via RS-485 converter, dial-up, leased line from a defined communication port or by LAN/WAN using an IP address for direct connection to the intelligent controller via network interface card. When using IP addressing it shall be un-acceptable to use a communication port converter device on the communication server side of the transmission. A minimum of 255 such IP connections shall be allowed per communication server.

y. All commands and updates to the panels shall be verified and shall automatically retry if communications fail.

z. Shall provide a system scheduler that shall automatically: Call remote locations to retrieve history transactions and update panel information, including time and date, Activate or deactivate cards locally or at remote dial-up sites, Initiate a pre-programmed command event/action, Synchronize system to intelligent controller time, Run a pre-defined (template) History report, Run a pre-defined (template) Card Holder report, Card frequency report defined by reader(s), over a defined period of time with disposition options to automatically report or report and de-activate card or change the access level of the card, Frequency shall be defined as Never, Now, Once, Hourly, Daily, and Weekly, Once per 2 weeks, and Monthly.

aa. Shall provide drop boxes for all system-required information that the user has previously entered.

bb. Shall provide the ability to initiate an email (via SMTP using SSL and TLS services) or page to a paging system based on a transaction state. A transaction state shall be defined as but not limited to Normal, Alarm, Trouble, Ajar, Trace, Not Found, Anti-Passback Violation, PIN Violation, Time Zone Violation, Site Code Violation, Door Used, Duress, No Second Card Presented, Trace Card or Expired Card, and System Alarms including, Panel Com, Panel Power Failure, Modem Pool, Guard Tour, and Tamper. Intrusion partition events including but not limited to: Alarm, Alarm Cancel, Aram Away, Arm Stay, Auto Arm, Auto Disarm, Bypass, Disarm, Early Arm, Early Disarm, Fail to Arm, Fail to Disarm, Normal, Not Ready, Part Arm, Quick Arm, Recent Close, Remote Arm, Remote Disarm, Unbypass, User Code Added, User Code Deleted, user Code Edited. Intrusion zone events including but not limited to: Alarm, Alarm Restore, Bypass, Fault, Fault Restore, Normal, Trouble, Trouble Restore, and Unbypass. Intrusion output events including but not limited to: Alarm, Communication Loss, Normal, Tamper, and Tamper Restore. Intrusion panel events including but not limited to: Access Denied, Automatic Test, Comm Fail, Comm Restore, Faults, Faults Restore, Line Restore, Line Trouble, Manual Test, Pager Restore, Pager Trouble, AC Restore, AC Trouble, Alarm, Battery Low, Battery Low Restore, Disarm, Normal, Recent Close, Reset, Panic Alarm, Power Up, Program begin, Program Changed, Program End, System Shutdown, System

Shutdown Restore, Tamper Alarm, Tamper Restore, Test End, Test Start, Time/Date changed.

cc. Shall include a “host grant” mode of operation that requires the host computer to grant accesses to “valid” cards. An alternate host grant mode shall allow the card access information to be downloaded along with unlocking the door for “valid” cards.

2. Cards

a. Shall provide a simple card and card holder database import utility. The utility shall be password protected and accessible only to administrators of the access control system. Information that can be imported shall include but not be limited to: First Name, Last Name, Card Number, Activation Date, De-activation Date, Status, up to 40 note fields and Photo Images. A simple CSV (comma separated value) file shall be used for the importing of data and image file names.

b. Cardholder information shall include unique card number up to 20 digits and optional Personal Identification Number up to 10 digits.

c. Shall allow multiple cards, mobile access credentials or finger print enrollment per cardholder.

d. Shall allow 32 access levels to be assigned to a card, or a single “precision” access level. When using “precision” access levels it shall be possible to create a unique access level per card using an existing access level as a baseline template. This customized card access level shall have both beginning and ending dates.

e. Shall provide 40 user defined fields.

f. Each card holder note field shall allow the option to be entered as free form data or structured data. Structured data shall be by use of a template or drop list. The template and drop list shall be created by the operator. The capacity of the template shall allow for up to 65,000 characters.

g. Provides special card options that shall include, but are not limited to: Time zone reference, which defines valid time; visitor use, which provides a specified activation date and expiration date (spanning years); limited use up to 255 uses; allow arming of the intrusion system; Standard, Supervisor and VIP card type providing special door privileges based on scheduled or event based functions; Trigger control value, which can initiate a predefined procedure at the intelligent control independent from any control function from the system computer.

h. Shall provide a card “Trace” function. The Trace function shall allow normal access control, but will provide a tracking alarm at the system monitor.

i. Shall provide the ability to store digital images of cardholder or other digital images such as property or family members. Up to 99 such images shall be associated with the cardholder.

j. Shall provide the ability to store a written signature of the cardholder or other signatures such as family members. Up to 99 such signatures shall be associated with the cardholder.

k. Shall provide the ability to prioritize specific card event types from 1 to 99 with separate priority options that shall include but not be limited to Anti-pass back, Trace, PIN Violation, Normal, Not Found, Expired, Host Grant, Site Code and Time Zone card activities or violations.

l. Shall allow the user the ability to send an e-mail message, selectable per card event type.

m. Upon editing card and biometric information, the updated information shall be sent automatically to the appropriate access control panel, when hardwired, with no other user intervention. If the port is dial-up, the entry will be stored on disk and shall be updated when connection is made to the remote loop. If the scheduler is used, then card updates shall be sent based on scheduling.

n. In a traditional (Wiegand) 5-digit card database, the numbers 0 and 65,535 shall not be valid card numbers as some devices transmit these numbers on an improper read.

o. Duplicate Card numbers shall not be allowed within an Account. However if more than one account is used, each account can have a single occurrence of the same number and per account that card number can be used by a different card holder.

p. Integrated biometric enrollment functions shall be managed directly inside the PAC UI without the need to use a 3rd party software.

q. Integrated assignment/managing/enrollment of mobile access credentials shall be accomplished inside the PAC UI without the need to external or 3rd party portals or software.

3. Access Levels

a. Shall provide an option to define specific access times.

b. Shall provide an option to define specific readers for access.

c. Shall provide a template of a defined access level detail, where changes can be made to the template and saved as a new access level detail.

d. Shall provide an access control tree structure that allows groupings of entrances. User shall have the ability to group program all entrances on the branch or make specific changes to individual entrances.

e. Shall provide an option per reader so configured, to select a predefined group of relays to utilize instead of a single relay. Commonly used for elevator control applications. The relay "Group" can also provide uniquely programmed pulse time used to allow varying access time for special needs applications.

4. Video Management Server

a. Shall support the following Digital Video Recorders (DVRs): RapidEye, MAXPRO NVR, HRDP Performance Series, Performance Series (ENVR) and Fusion from Honeywell.

b. Shall provide an option to configure the DVRs to a video management server.

c. Shall provide an option to configure the cameras, inputs, and outputs to the DVRs.

d. Shall provide an interface to a network of digital video servers.

e. Shall provide an option to discover all the cameras connected the DVRs.

f. Shall provide the ability to manually access live video from any camera on any defined digital video server.

g. The viewer windows shall allow at least 16 live videos to be displayed at one time.

h. The viewable size of the viewer salvo window shall be adjustable by using the common "click and drag" method. When adjusting height or width, the image shall retain the correct aspect ratio.

i. Shall provide the ability to automatically pop-up any camera in the system based on any alarm point, system alarm or cardholder video image pop-up.

j. Shall provide the ability to manually control the pan, tilt, and lens functions (zoom, iris, and focus) of cameras so equipped.

k. A "live view" from the Digital Video Server shall be displayed on the system computer without the use of any add in video capture card.

l. Live views shall allow for the change in image resolution or aspect ratio to optimize the viewing quality to the native video.

m. The ability to change the size and location of the view shall exist.

n. The digital video server window shall also supply the ability to select a digital video server, camera, live, from stored video using user defined time and date.

o. A filter option shall allow the operator to define a date, time, transaction type, device(s), card holder, card number, note field, card event type and alarm status. Once filtered all events will be displayed in a listing. The listing shall include on the same event line if the event has an associated video clip. By clicking on the event, the time, date, camera, and digital server shall be preloaded in the manual selection boxes allowing the operator to simply click on the sorted event and then click on “show” to display the recorded event.

p. Video Masking with Four-Eye override shall ensure privacy is managed in accordance to GDPR requirements.

5. Camera control

a. Shall provide an option to configure the settings of cameras connected to the respective DVRs.

b. Shall provide an option to manually control the pan, tilt, and lens functions (zoom, iris, and focus).

c. Shall provide an option to automatically switch any camera in the system to any monitor in the system based on any alarm point or system alarm.

d. Shall display the live and recorded video in salvo window.

e. Shall provide a set of options such as color correction, sync playback, flip, playing speed, remove text overlay and soon to customize the display of live and recorded video.

f. Shall provide an option to configure the Video Motion, Video Loss, and PTZ loss events to cameras associated to all the DVRs.

6. Alarm Monitoring – Alarms Only View

a. Shall report alarm point activity.

b. Shall provide color for each specific alarm point action, “Alarm”, “Normal”, and “Trouble”, conditions.

c. Shall provide the ability to access the default floor plan graphic for any active alarm point by a right click option.

d. Live video pop-up from the digital video server(s) shall follow the alarm event pop-up. The number of live camera views in the pop-up window shall be no less than 16. The live pop-up window shall allow the user to define the quantity of views from 1 – 16. The ability to adjust the size of the live pop-up window shall exist.

e. Shall provide ability to bypass alarms in the system.

f. Shall execute alarm notification in all modes of operation.

g. Shall provide ability to acknowledge any intrusion alarm, event alarm, system alarm, card, or reader activity based on priority.

h. Shall provide display of system activity with the higher priorities displayed at the top of the list with identical points stacked with a frequency count of each point's change of state.

i. Shall provide a video icon for events that have video associated with it. Right-clicking on such an event shall allow the option to retrieve recorded video or view "live". The stored video clip shall playback by default a minimum of 2 seconds before the actual event without any adjustment.

j. Viewable alarms shall include but not be limited to access control related events such as Door Normal, Door Alarm, Door Trouble, Door Ajar; Card events such as Not Found, Anti-Passback Violation, PIN Violation, Time Zone Violation, Site Code Violation, Door Used, Escort access Granted, Site Code Violation, Invalid format, Supervisor card Authenticated, Supervisor card Found, Supervisor mode Disabled, Supervisor mode Enabled, Supervisor card Required, Temporary Card Expired by Date, Temporary Card Expired by Number of Uses, VIP card Found, Duress, No Second Card Presented, Trace Card or Expired Card, and System Alarms including, Panel Com, Panel Power Failure, Modem Pool, Guard Tour, and Tamper. Intrusion partition events including but not limited to: Alarm, Alarm Cancel, Aram Away, Arm Stay, Auto Arm, Auto Disarm, Bypass, Disarm, Early Arm, Early Disarm, Fail to Arm, Fail to Disarm, Normal, Not Ready, Part Arm, Quick Arm, Recent Close, Remote Arm, Remote Disarm, Unbypass, User Code Added, User Code Deleted, user Code Edited. Intrusion zone events including but not limited to: Alarm, Alarm Restore, Bypass, Fault, Fault Restore, Normal, Trouble, Trouble Restore, and Unbypass. Intrusion output events including but not limited to: Alarm, Communication Loss, Normal, Tamper, and Tamper Restore. Intrusion panel events including but not limited to: Access Denied, Automatic Test, Comm Fail, Comm Restore, Faults, Faults Restore, Line Restore, Line Trouble, Manual Test, Pager Restore, Pager Trouble, AC Restore, AC Trouble, Alarm, Battery Low, Battery Low Restore, Disarm, Normal, Recent Close, Reset, Panic Alarm, Power Up, Program begin, Program Changed, Program End, System Shutdown, System Shutdown Restore, Tamper Alarm, Tamper Restore, Test End, Test Start, Time/Date changed.

k. Shall provide the ability for an operator to acknowledge and clear alarms from display. Prior to acknowledgment, the user shall be allowed to enter a response per alarm. The system shall offer a means to require acknowledgement of an alarm before it can be cleared.

l. Shall provide a display of the most current transactions in real time.

m. Shall provide the ability for dynamic alarm monitoring of alarm points in real time on the system computer's video display terminal.

n. Shall provide an alarm view filter that is structured as a tree allowing the operator to select individual devices or groups of devices to be viewed.

o. Shall provide a “System” alarm upon a loop integrity violation.

p. Shall provide a “Panel Not Responding” alarm if communication to a panel is lost.

q. Shall provide real time printing of alarms as they occur by line printing with a dot matrix printer or provide printing of alarms, one page at a time, using typical Windows page printing.

7. Alarm Monitoring/System Control – Tree View

a. Shall provide the ability for dynamic alarm monitoring of alarm points in real time on the system computer’s video display terminal.

b. Shall provide color and icon shapes for each specific alarm point action of “Alarm”, “Normal”, “Trouble”, and “Shunted”.

c. Access control panels in the alarm tree, like alarm points, shall also indicate if they are in the buffered mode of operation as well as any “system” related alarm such as “Tamper” or “Primary Power Loss” or Loss of communication.

d. Devices connected to the communication server shall provide additional popup information as to the communication port or IP connection the device is programmed for.

e. Shall provide an option to launch a Virtual keypad from an intrusion panel partition to monitor the physical keypad remotely and to administer programming changes via the Virtual keypad.

f. The control tree shall be created by the user and allow for manual of control of all system devices. By right clicking on a device in the tree, the operator can initiate the appropriate action from a pick list. Actions shall include but not be limited to: Acknowledge All Alarms, Clear All Alarms, Send Time & Date, Send Camera Titles, Camera to Monitor Switch, Control Camera P/T/Z, Focus, Iris, Live Video, Retrieve Video from Clip, Run Command File, Lock, Unlock, Shunt, Unshunt, Pulse, Timed Pulse, Restore to Time Zone (Door Mode), Time Zone Schedule creation, change, Override Online Door Mode (Open, Lock, Card only, Card or PIN, Card and PIN, PIN only, Supervisor mode enable/disable, Supervisor mode, Escort Mode, Standard Mode), Initialize, Cancel Initialization, Buffer, Unbuffer, Connect Remote and Disconnect Remote from remote site. For partitions monitored by the intrusion panel the control shall include but not be limited to arm away, arm stay, disarm, refresh, and provide a virtual keypad for the partition. For zones monitored by the intrusion panel the control shall include but not be limited to bypass, unbypass and refresh. Intrusion panel output control shall include activate, deactivate and refresh.

8. Operator Database

    a. Shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change, or delete.

    b. Shall have the ability to view, edit, or delete cardholder sensitive information such as note fields, card number, and PIN shall be definable by field per operator.

    c. Shall provide the ability to define the accounts that the operator has access to.

    d. Shall provide the ability to log operator actions in the history files.

    e. Shall provide the ability to select the default language during operator logon.

    f. Shall provide specified time periods for the operator to logon

    g. Shall provide the ability to select if access to the Web browser is allowed.

9. Access Control Panels

    a. Shall provide ability to program Action Messages and assign an alarm event priority. A specific action message may be displayed for each alarm, system alarm (communication, ground fault, power, panel reset, low voltage, and panel tamper), card, or reader usage state. States shall include but not be limited to: Incorrect Password, Panel Configuration Error, Panel Remote Dial-up Failed, Panel Remote Dial-up Successful, Poll Response Alarm, Poll Response Normal, Primary Power Failure, Primary Power Normal, Tamper Switch Alarm, Tamper Switch Normal, Unsupported Panel Version, Anti-Pass back Violation, Anti-Pass back Violation Door Not Used, Anti-Pass back Violation Door Used, Card Not Found, Door Normal, Door Alarm, Door Trouble, Door Ajar, Door Locked, Door Unlocked, Duress Request Denied, Duress Request Door not Used, Duress Request Door Used, Forced Open, Free Egress Door Not Used, Free Egress Door not Verified, Free Egress Door Used, Host Grant Card Downloaded, Host Grant Door Unlocked, Invalid Format, Invalid Format Reverse Read, Invalid Pin, Invalid Site Code, Invalid Time zone, Issue Code, Never Allowed at this Door, No Second Card Presented, Site Code Verified Door Not Used, Site Code Verified Door Used Trace Card, Valid Card Door Not Used, Valid Card Door Used, Escort access Granted, Site Code Violation, Invalid format, Supervisor card Authenticated, Supervisor card Found, Supervisor mode Disabled, Supervisor mode Enabled, Supervisor card Required, Temporary Card Expired by Date, Temporary Card Expired by Number of Uses, VIP card Found. Intrusion partition events including but not limited to: Alarm, Alarm Cancel, Aram Away, Arm Stay, Auto Arm, Auto Disarm, Bypass, Disarm, Early Arm, Early Disarm, Fail to Arm, Fail to Disarm, Normal, Not Ready, Part Arm, Quick Arm, Recent Close, Remote Arm, Remote Disarm, Unbypass, User Code Added, User Code Deleted, user Code Edited. Intrusion zone events including but not limited to: Alarm, Alarm Restore, Bypass, Fault, Fault Restore,

Normal, Trouble, Trouble Restore, and Unbypass. Intrusion output events including but not limited to: Alarm, Communication Loss, Normal, Tamper, and Tamper Restore. Intrusion panel events including but not limited to: Access Denied, Automatic Test, Comm Fail, Comm Restore, Faults, Faults Restore, Line Restore, Line Trouble, Manual Test, Pager Restore, Pager Trouble, AC Restore, AC Trouble, Alarm, Battery Low, Battery Low Restore, Disarm, Normal, Recent Close, Reset, Panic Alarm, Power Up, Program begin, Program Changed, Program End, System Shutdown, System Shutdown Restore, Tamper Alarm, Tamper Restore, Test End, Test Start, Time/Date changed, Identification Success: Fingerprint, Identification Success: Fingerprint and Card, Verification Success: Card, Verification Success: Card and Fingerprint, User download success, Identification Failed, Verification Failed, Not Granted, Identification Duress.

b. Shall provide the ability to program descriptions, shunt times, and momentary shunt times for all system alarm points.

c. Shall provide ability to program descriptions, pulse times, and energize times for all system output relays used for door control and other auxiliary functions.

d. Shall provide the ability to program descriptions for all system card readers.

e. Shall monitor both supervised and non-supervised alarm points with the ability to select by point which point shall be supervised and define if the point is a normally closed or normally open point contact.

f. Shall provide the ability to interlock any alarm point condition to an output relay.

g. Shall provide the ability to interlock any alarm point condition to another alarm point.

h. Shall provide the ability to interlock any alarm point to switch a camera to a system monitor.

i. Shall provide ability to program alarms and associate incoming alarms with related outputs.

j. Shall provide a programmable “delay” setting of 255 seconds for all system alarm points. The system shall not report the alarm condition until the delay setting has expired.

k. Shall allow 8 different site codes to be used in the system.

l. Shall support 32 readers per Intelligent Control Module.

10. Reports

a. Shall provide Card holder report capability with filter options to define door(s) that a card holder has access to, reporting card holder name, Card(s), Access

Level/schedules, Activation/Expiration. Available in the Browser and workstation.

b. Shall provide reporting capability for printing of selected system transactions from the disk files by specific time and date selection, range from time and date to time and date, or from start time to end time each day of the selected date range. Available in the Browser and workstation.

c. Shall provide reporting capability for selected card number displaying an audit trail of card changes detailing from-to when and by who. Changes shall include but is not limited to access level changes, activation/expiration dates, card number edits, and card holder name changes. Available in the Browser and workstation.

d. Shall provide a feature to generate a history report for an alarm point(s) state. An alarm point state shall be defined as Normal, Alarm, Trouble, or Ajar.

e. Shall provide a feature to generate a history report of system alarms. A system alarm state shall be defined by panel and include any of the following information: communication, ground fault, power, panel reset, low voltage, panel tamper, and loop communication.

f. Shall provide a feature to generate an ADV actions report, which provides information on how the system ADVs are configured including detailed/advanced video configurations.

g. Shall provide a feature to generate a history report for a card(s) state. A card state shall be defined as Normal, Trace, and Not Found, Anti-Passback Violation, PIN Violation, Time Zone Violation, Site Code Violation, or Expired card, Identification Failed, Verification Failed, Not Granted and filter the report with defined reader location(s). Available in the Browser and workstation. Additional search criteria shall be available at the workstation to include cardholders that meet up to at least 3-note field restrictions.

h. Shall provide a feature to generate a history report for system operator(s) activities. The report shall include time, date, operator name the device associated with the action and the type of action performed by the operator. Activities shall include but not limited to: acknowledged and cleared transactions, camera control, door mode, door and relay control such as unlock, lock; door and input control such as shunt, Unshunt; login, logout, panel initialization, panel buffer and panel Unbuffer.

i. Shall provide complete database reporting of all data programmed into the system data files.

j. Shall provide an option to define how long a card holder has been in a defined area. This report shall allow the time to be accumulated representing an attendance report. The definable filters shall include time/date range,

reader(s) definition, card number, card holder and note field. The output of the report shall allow sort options to include First Name, Last Name, Event Time, and Card Number. The sorted data shall be selectable as Alpha or Numeric sorting and Ascending or Descending.

k. Shall provide feature to generate a report based on the frequency of usage of a card. The report shall allow the operator to define a time/date period, a minimum and maximum usage limit, a means to define which reader or readers should be used to filter the report and the ability to further define the type of card to be reported on based on note field selections. This report shall be available in the Browser and Workstation. Further a Workstation shall also provide a disposition function. The cards meeting the filtering criteria shall be acted upon based on the disposition setting. Disposition settings shall include but not be limited to: Report only, De-activate the card or Re-assign to a specified an access level. This report shall be available in the event scheduler. When defining when to run the report an option to select the number of previous days to run the report against shall be provided. As an example, a scheduled weekly report for the last 14 days could generate allowing for an overlap of time if desired.

l. Shall provide an option to create report templates. Report templates available in the Browser and Workstation shall include, but not be limited to, Access Level, Card, Card History, Door, Holiday, Time Schedules and Card Holder information. The templates shall be able to be assigned to a scheduler to run automatically per the scheduler settings.

11. Tracking/Muster Report

a. A tracking feature shall allow the system operator to identify an area and the person(s) in that area.

b. Areas shall be defined by readers representing an IN or OUT read status.

c. Defined areas shall provide an automatic update of how many cardholders are in the area.

d. An area defined as an exit shall remove the person from the tracking area.

e. A view displaying all cardholders in a defined tracking or muster area shall have the ability to be sorted in columns where by clicking on the column the data in the column shall be sorted. At a minimum, the columns can be sorted by: Card Number, Status, Card Holder, Reader, and Time/Date.

f. A Muster area shall be defined by a reader(s) used to “muster” individuals in the event of an emergency.

g. Reports can be generated for the defined muster or tracking area. Available in the Browser and Workstation.

h. Reports shall be generated for all muster or tracking areas in the system

i. Tracking and Muster report template(s) shall be defined including whether it should be emailed and/or printed base on Event(s), Schedule(s) or assigned to a “Hot key” on the tool bar to be manually run when needed.

j. Reports shall be sorted on time and date, card number, card holder name or matching note field. When sorted on note field, a page break between fields shall allow the report to be easily handled for departmental uses.

k. Tracking areas shall include “nested” areas. Nesting allows for various reports from a large area to smaller areas within the large area.

l. A Tracking and Muster area screen shall be continually updated with the most recent cardholder activity, therefore minimizing the time required generating a report.

m. A history priming feature shall load history activities for the defined number of hours when the software is started. This priming feature shall be implemented if the system computer is offline when a muster call is initiated, thereby allowing the implementation of the tracking and muster features of the software. The history priming time shall be operator selectable in 1-hour increments up to 99 hours.

12. Time Zones

a. Time zone definitions shall include Starting time, Ending time, Days of the week, and Holiday override.

b. Time shall be defined in either AM/PM or 24-hour (military) time.

c. The minimum time zone that shall be assigned to a panel is 63.

d. The maximum time zones that shall be defined in a system is unlimited.

e. Holidays shall be defined in two different time zones allowing different time schedule to be programmed for each holiday type.

f. Holidays shall be grouped in a Holiday Group.

13. Floor Plan Graphic

a. Shall provide the ability to import floor plan graphics stored in a WMF format.

b. Shall provide the ability to associate all ADV's (access, intrusion, and video) to floor plan graphics allowing the user to control and monitor the system.

c. Shall provide the ability to link floor plan graphics together in a hierarchy fashion.

d. Shall allow multiple floor plan views to be displayed simultaneously.

14. Remote Locations

a. Shall provide the ability to communicate to panels in real-time via encrypted Ethernet communication or support remote dial-up locations. Dial-up locations shall support the ability to place remote control panels in an offline mode. In the offline mode, the remote-control panels shall retain all panel history events. The number of historical events shall be limited to the panels' buffer capacity.

b. Shall provide the ability to place remote control panels in an offline mode where the remote panel will automatically call to the communications computer to report system alarms or upload buffered events.

c. Shall provide the ability to manage at up to 250 remote locations per communication server.

d. Shall provide a user-defined schedule that will automatically add cards to any number of sites.

e. For remote panels not configured for real-time communications, the ability shall exist to provide system time schedules that the computer will use to automatically start uploading or downloading information to the remote sites. Information to be sent to the panel shall include, but not be limited to, card database changes, time, date, and buffer condition. Information received from the panel shall include all buffered events. While connected to the remote site, the system software shall poll, verify, and report any loss of panel communication. If a site's communication time is longer than expected, the system will automatically adjust the time schedule to allow all selected sites to be updated.

f. For remote panels not configured for real-time communications the remote site can also be supported via an auto dial schedule and shall allow the system to automatically dial the remote site at a predetermined time. The auto dial schedule is programmed with the ability to dial Once, Now, Hourly, Daily, Weekly, Two Weeks, Monthly, or Never to the remote site.

g. Shall provide the ability for an operator to program when the next scheduled update will occur, based on time and date.

h. Communication to remote dial up sites shall be accomplished using password protection. The remote site provides the system with a site ID; the system responds with the appropriate password. No commands or transactions occur until the communication link is verified.

i. The System shall be able to receive or send information to remote access control panels on demand.

j. Shall have the ability to configure how many redial attempts from the remote location shall be defined from 1 to 5.

k. Shall have the ability to pause between redial attempts shall be programmable from 1 to 120 seconds.

l. Shall have the ability to pause before disconnecting shall be programmable from 1 to 30 seconds.

15. Guard Tour

a. Guard Tour shall allow the operator to program a series of guard check points that must be activated to accomplish the task of a Guard Tour.

b. The check point shall be either card reader points or alarm contact points or a mixture.

c. The Guard Tour shall be timed sequential allowing travel time between points with +/- tolerance. This type of tour shall allow alarms to be generated for early, missed, or late events.

d. The Guard Tour shall be un-sequenced with no time parameters.

e. The Guard Tour shall be started by two methods, Manual or Scheduled by the access control system scheduler.

16. ID Badging System/Video Image System

a. Shall allow any card data fields to be assigned to a badge.

b. Shall allow a stored cardholder image to be associated to any background. Each cardholder shall have any one of the background layouts associated to it.

c. Shall provide the ability to create temporary or permanent badges.

d. Badges shall be printed via the workstation without the need to assign an access level or access control card number. Numbers and access levels may be assigned after the print process.

e. Badges shall be printed via the browser after a card number has been assigned to the CardHolder.

f. Shall provide the image export capability. Image shall be exported utilizing the cardholder’s name as the file name in .jpg format.

g. Shall provide unlimited custom badge layouts (only limited by the hard disk capacity).

h. Shall provide 24-bit (16.7 Million) color palette for background design or foreground text.

i. Shall provide the ability to implement all fonts supported by Windows.

j. Shall provide import capabilities of background information using video camera or BMP, JPG, or TGA files.

k. Shall provide import capabilities of video images from the compatible BMP, JPG, PCX, or TGA file formats.

l. Shall provide the ability to import multiple bitmap images to the badge layout.

m. Shall provide video capture capability from a compatible TWAIN device.

n. Shall provide video capture capability from a DirectX device.

o. Shall provide video capture capability from a compatible video capture device, such as a high-resolution color camera.

p. Shall provide badges in horizontal or vertical format.

q. Shall provide capability for printout of cardholder badge by video or standard printers supported by Windows.

r. Shall provide ability for multiple card enrollment/badging stations on networked system.

s. Shall allow text fields limited to a maximum of 255 characters per field.

t. Shall allow merging of data field from card database to text field.

u. Shall allow a field to be defined for bar code usage merging data from the card database.

v. Shall allow 99 different photos of the cardholder to appear on the same badge.

w. Shall provide line, rectangle, rounded rectangle, and ellipses to be created on the backdrop with provisions for line thickness and color.

x. Shall provide signature capture or import capability for 99 signatures that can be previewed in the cardholder's badge or printed on the cardholder's card.

y. Shall provide the capability to have a front and back layout selected for a cardholder and the ability to print the card in one step (requires suitable printer) without the need to reinsert the card.

z. Shall provide the ability to encode a magnetic stripe with information from any of the card data fields to include, but not be limited to: First Name, Last Name, Card Number, Activation date, Expiration Date, or any data from the card holders note field.

aa. Information shall be encoded on track 1, 2, or 3 (requires suitable printer) without the need to reinsert the card. With suitable printer, each track shall be encoded with ABA, IATA, or TTS format.

17. Networking

a. Shall provide networking capabilities (LAN or WAN) as allowed by the computer's operating system license.

b. The access control software shall support two networking methods. By default, Domain controlled networks shall be the standard configuration providing secure networking communications. The ability to work on less secure peer-to-peer (Workgroup) networks shall be allowed for lower security installations. The functionality shall be one or the other and not run in both modes at the same time.

c. Shall provide the ability for a network system to support concurrent users up to the license limit (one station adding cards and making badges, another station monitoring alarms, yet other running data base reports, another controlling door openings and alarm shunting, and so on).

d. The workstation shall have the same user interface functionality as the Server, except the workstation shall not be able to perform database maintenance functions.

2.4 ISMS Hardware and Software Requirements

A. The ISMS shall be installed in a computer that supports 1 to 10 readers, 250 cards, and 2 communication ports. Workstations added to a Server shall also use these specifications. The minimum hardware and software requirements to fulfill this installation are:

1. Processor: Intel® Core i3 - Desktop class machine
2. CPU: 3.3 GHz
3. RAM: 8 Gigabytes (GB) for standalone installation; 4 Gigabytes (GB) for workstations
4. Hard Disk: 120 GB SATA with minimum 60 GB free space; Workstation(s) 80 GB with 5 GB free
5. Serial Communication Ports: As required by the application
6. Secondary Storage: Tape or DVD burner
7. Printer port: 1 (or network printer)
8. Monitor Display: Size: 15 Inches SVGA, Resolution: 1024 x 768, Colors: 256
9. Pointing Device: Mouse (USB preferred)
10. Power Supply: UPS
11. Operating System: Minimum 64-bit Microsoft Windows® 10 Professional; Windows 8.1 Professional for workstations.
12. Database: Microsoft SQL Server 2016 Express Edition

B. The ISMS shall be installed in a computer that supports 1 to 100 readers, 5,000 cards, and 8 communication ports. The recommended hardware requirements to fulfill this installation are:

1. Processor: Quad Core Intel® Xeon®
2. CPU: 2.4 GHz
3. RAM: 16 Gigabytes (GB)
4. Hard Disk: 250 GB SATA or SCSI or SSD (60GB free space)
5. Serial Communication Ports: 2
6. Secondary Storage: Tape or DVD burner
7. Printer port: 1 (or network printer)
8. Monitor Display: Size: 20 Inches, Resolution: 1600 x 900, Colors: True color
9. Pointing Device: Mouse (USB preferred)
10. Power Supply: Hot-swap, redundant with UPS
11. Operating System: Microsoft Windows® 10 Professional (standalone system or Workstations); Windows Server 2012 R2 Standard when additional workstations and or communication servers are added also use for additional communication servers (PE/CS only).
12. Database: Microsoft SQL Server 2016 Express Edition

C. The ISMS shall be installed in a computer that supports that supports more than 100 readers, 100,000 cards and 255 communication ports, the maximum/performance hardware requirements to fulfill this installation begin with:

1. Processor: Intel® Quad Core Xeon® Intel® Quad Core Xeon® - Server class computer
2. CPU: 3.5 GHz or more
3. RAM: 32 Gigabytes (GB)
4. Hard Disk: 1TB SATA 15000 RPM or SSD
5. Serial Communication Ports: As per the requirement
6. Secondary Storage: Tape or DVD burner
7. Printer port: 1 (or network printer)
8. Monitor Display: Size: 24 Inches, Resolution: 1920 x 1200, Colors: True color
9. Pointing Device: Mouse (USB preferred)
10. Power Supply: Hot-swap, redundant with UPS
11. Operating System: Microsoft Windows Server 2016
12. Database: Microsoft SQL Server 2016 with processor/core license

2.5 HARDWARE REQUIREMENTS

A. INTELLIGENT CONTROLLERS

1. Distributed architecture shall allow controllers to operate independently of the host. The architecture shall place key access decisions, event/action processing, and alarm monitoring functions within the controllers, eliminating degraded mode operation.
2. Flash memory management shall support firmware updates and revisions to be downloaded to the system. Upgrades to the hardware and software shall occur seamlessly without the loss of database, configurations, or historical report data.
3. Manufacturers: Subject to compliance with requirements, provide Field Controllers or comparable product by one of the following:
    a. Honeywell NetAXS Controller (NetAXS-123 and NetAXS-4 are the two types of NetAXS controllers)
    b. Honeywell P-Series Controller (PRO-3200, and PW-6000 are the types of P-Series controllers – Legacy support for PRO-2200, PW-5000) PRO-3000 (APAC regional panel)
    c. Honeywell N-1000 or PW-2000 Controller (Legacy support)
    d. Honeywell Security NS2 or NS2+ (Legacy support)
    e. Honeywell FIN-4000 Panels (HON-FIN4000MIK-100K, HON-FIN4000AC-100, FIN4000K-10K, FIN4000-10K and FIN4000K-20K)

B. FIELD HARDWARE

1. The security management system shall be equipped with access control field hardware required to receive alarms and administer all access granted/denied decisions. All field hardware shall meet UL requirements.
2. Intelligent Controller Board
    a. Honeywell Security PRO32IC
3. Single Reader Module (SRM)
    a. Honeywell Security PRO22R1
4. Dual Reader Module (DRM)
    a. Honeywell Security PRO32R2
5. Alarm Input Module (AIM)
    a. Honeywell Security PRO32IN
    b. 16 Inputs 2 Outputs
6. Relay Output Module (ROM)

a. Honeywell Security PRO32OUT

b. 16 Outputs 2 Inputs

7. Card Readers

a. Proximity

b. Magnetic Stripe

c. Wiegand

d. Barcode

e. BLE

2.6 SYSTEM INTERFACES

A. Digital Video Recording Systems

1. The Security Management System shall provide fully integrated support for a powerful digital video recording and transmission system. The Security Management System shall record, search and transmit video, and shall provide users with live, pre- and post-event assessment capabilities. The DVRs shall be seamlessly integrated with existing video equipment and incorporated into any TCP/IP network. The DVRs shall provide multiple levels of integration with the Security Management System software, providing control of the digital video system from the access control application.

2. WIN-PAK shall support the following Digital Video Recorders (DVRs).

a. Rapid Eye

b. Fusion

c. HRDP Performance Series

d. MAXPRO NVR / ENVR

e. Performance Series

3. Manufacturer(s) and part numbers:

a. Honeywell MAXPRO® NVR recorders

b. Honeywell Performance Series

c. Honeywell Fusion IV series digital recorders

d. Honeywell Rapid Eye Multi-Media series digital recorders

e. Honeywell HRDP recorders

B. Access Control Panels(Controllers)

a. Honeywell N-1000 or PW-2000 Controller, Honeywell NS2, NS2+ Controller, Honeywell P-Series Controller (PRO-2200, PRO-3000, PRO-3200, PW-5000, and PW-6000 are the types of P-Series controllers), Honeywell NetAXS Controller (NetAXS-123 and NetAXS-4 are the two types of NetAXS controllers), Honeywell FIN4000 Panels (HON-FIN4000MIK-100K, HON-FIN4000AC-100K, FIN4000K-10K, FIN4000-10K and FIN4000K-20K).

2. P Series Panels shall have the following capabilities:

   a. Stores 50,000 cards/key codes for PRO-2200, stores 1 00,000 cards/key codes for PRO-3200/PW-5000/PW-6000.

   b. Supports ABA and WIEGAND card formats.

   c. Types of P-Series panels are: PRO-3200, PW-6000, and legacy PW-5000 and PRO-2200).

   d. Eight SIO Boards are included in the PRO-2200 panel. A maximum of 16 SIO boards are supported by the PRO-3200 panel. 32 SIO Boards are included in the PW-5000 and PW-6000 panel. SIO boards enable extended input and output capabilities to the panel.

   e. Readers, inputs, and outputs that can be connected to the panel are based on the type of SIO Board that is added to the panel. The SIO Board types include 16-Zone Input/output (16 inputs, 2 outputs, and 0 readers), 16-Relay Output (0 inputs, 16 outputs, and o readers), 2-Reader I/O (2 inputs, 8 outputs, and 6 readers), and 1-Reader I/O (1 input, 2 outputs, and 2 readers).

3. NetAXS Panels shall have the following capabilities:

   a. Types of NetAXS panels available are: NetAXS-4 panel and NetAXS-123 panel.

   b. Panels (NetAXS-123 and NetAXS-4) are called as Gateway panels when added directly to the communication server.

   c. NetAXS-4 Gateway panel supports the downstream devices feature. This feature shall extend the input and output capabilities of the NetAXS-4 panels.

   d. NX4IN and NX4OUT

      1) NX4IN is a 32 input and 0 output downstream add on device

      2) NX4OUT is a 2 input and 16 output downstream add on device

   e. Supports only the WIEGAND card format. The NetAXS panel allows multiple sets of card numbers and site codes embedded in a card format. These multiple embedded sets will be represented as A, B, C, and D sets of card numbers and site codes. The A set shall be used as the default / primary card and site code numbers. The resulting maximum length of the card number will be 64-bits in length (20-digit card number). This is the reason that the system

defaults will incorporate the ability to select a 20-digit card number size in addition to the existing 5, 12 and 16 digits

f. Supports 128 time slots and 255 holidays (per holiday group). Holidays shall be definable in three different holiday types thus allowing for different operational time definitions for each holiday type. The NetAXS panels shall have a provision to add a new time zone while within the panel database. After creating the new time zone, it shall be added to the Time Zones database and applied to the panel's database.

g. Panel options such as Anti-passback, Groups, Forgiveness, Continuous Card Reads, Reverse Read LEDs, Host Grant, Site Codes, and Command File can be set for providing access to the readers, input points, and output points attached to the NetAXS panels.

h. NetAXS-4 panel shall allow configuring of 14 inputs with default values. NetAXS-123 panel shall allow configuring 17 inputs with default values.

i. NetAXS-4 panel shall allow configuring of 16 inputs with default values. NetAXS-123 panel shall allow configuring 14 inputs with default values.

j. NetAXS-4 panel shall support 4 readers. NetAXS-123 shall support 6 readers controlling 3 doors where the "A" reader is the primary reader for the door and the "B" reader is the Out reader for the door when so used. The B Reader can be programmed separately regarding name, Advanced Options, Anti-Passback configuration, and Intrusion support. The B Reader cannot work alone as a Reader only. When used, the B reader will be tied to the A reader in terms of the interlock relationships pertaining to Door operation. The Advanced Options selection shall provide several advance features not normally used in the typical system and thus the reason they are accessed separately to reduce confusion for typical installations. For the NetAXS-123, Reader A and Reader B shall support their own settings.

k. The Groups option shall be supported only by the NetAXS-4 panels. A maximum of 64 groups shall be defined with a maximum of 76 relays.

4. HON-FIN4000 Panels shall have the following capabilities:

a. Type of HON-FIN4000 panels available are: HON-FIN4000MIK-100K, HON-FIN4000AC-100K, and legacy FIN4000K-10K, FIN4000-10K and FIN4000K-20K Panels

b. HON-FIN4000 work as standalone or as an access control panel/biometric reader directly supported by the PAC (WIN-PAK software) or as a biometric reader using the Wiegand interface to other supported access control panels.

c. HON-FIN4000AC-100K supports 125kHz EM, HID Prox & 13.56Mhz MIFARE, MIFARE Plus, DESFire/EV1, FeliCa, iCLASS SE/SR/Seos card technologies; 500,000 users (1:1) or 100,000 users (1:N)

d. HON-FIN4000ACK-10K supports 125kHz EM, HID Prox & 13.56Mhz MIFARE, MIFARE Plus, DESFire/EV1, FeliCa, iCLASS SE/SR/Seos card technologies; 10,000 users (1:1) or 10,000 users (1:N); 1.77" color TFT LCD; 160 x 128 pixels

e. Supports 128 time slots and 255 holidays (per holiday group). Holidays shall be definable in two different holiday types thus allowing for different operational time definitions for each holiday type.

f. Panel options such as Anti-passback, Groups, Forgiveness, Host Grant, Site Codes, and Command File can be set for providing access to the readers, input points, and output points attached to the panel.

g. HON-FIN4000 shall allow configuring of 3 inputs with default values.

h. HON-FIN4000 panel shall support an additional Wiegand reader for in/out management.

C. Intrusion Detection Panels:

1. Honeywell VISTA-128FBPT, VISTA-250FBPT, VISTA -128BPT and VISTA-250BPT

a. General Requirements: The Security Management System shall support hardwired and TCP/IP communication for the VISTA 128FBPT/VISTA-250 FBPT panel. Each panel shall have 8 partitions and 15 zone lists. Zones, partitions, and the top-level panel shall have an events page, with all supported events present. Features:

1) Disarm and unlock a door on card swipe.

2) Arm and lock a door on card swipe.

3) Common area arm/disarm.

4) Access denied if intrusion system is in alarm or armed.

5) Monitor and log intrusion system events and alarms in the Security Management System.

6) Associate intrusion system events and alarms to video surveillance integrations.

2. Honeywell Galaxy Dimension Controllers: GALAXY__GD264, GALAXY_GD_48, GALAXY_GD_96 GALAXY_GD_520, Firmware 6.80 and above, Ethernet module firmware 2.08 and above controllers. Honeywell Galaxy Grade 3 Controllers: GALAXY_144, GALAXY_20, Firmware 5.04/5.50 and above, Ethernet module firmware 2.01 and above. Honeywell Classic Panel Controllers: GALAXY_60, GALAXY_128, GALAXY_500, GALAXY_504, GALAXY_512, Firmware 4.50 and above, Ethernet module firmware 2.10 and above.

a. Security Management System users can control and monitor Group and Zone status using the Security Management System client, and control the individual

zones and groups using Security Management System Access control credentials. Depending on the combined user profiles and access permissions defined in Security Management System, Security Management System cardholder is allowed or denied permission to arm/disarm zones and groups. The access control functionality of the intrusion panel is disabled when the integration is operational. Features:

1) Disarm a zone on a card swipe.

2) Arm a zone on consecutive card swipes. Security Management System will support definition of quantity of swipes required and the timeout time in seconds to recognize consecutive swipes.

3) Security Management System supports linking of intrusion panel users with Security Management System cardholders.

4) Security Management System operators may be given control permissions for intrusion input and output alarms.

5) Security Management System can associate alarm events with video commands to look at current or historic footage.

6) Security Management System stores and reports on intrusion events.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine site conditions to determine site conditions are acceptable without qualifications. Notify Owner in writing if deficiencies are found. Starting work is evidence that site conditions are acceptable.

3.2 INSTALLATION

A. Integrated Security Management System, including but not limited to access control, alarm monitoring, CCTV, and ID badging system shall be installed in accordance with the manufacturer's installation instructions.

B. Supervise installation to appraise ongoing progress of other trades and contracts, make allowances for all ongoing work, and coordinate the requirements of the installation of the Security Management System.

3.3 FIELD TESTING AND CERTIFICATION

A. Testing: The access control, alarm monitoring, CCTV, and ID badging system shall be tested in accordance with the following:

1. Conduct a complete inspection and test of all installed access control and security monitoring equipment. This includes testing and verifying connection to equipment of other divisions such as life safety and elevators.
2. Provide staff to test all devices and all operational features of the Security Management System for witness by the Owner's representative and authorities having jurisdiction as applicable.
3. Correct deficiencies until satisfactory results are obtained.
4. Submit written copies of test results.

END OF SECTION

SECTION **281500**
ACCESS CONTROL HARDWARE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 & Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Card readers, credential cards, and keypads
2. Cables
3. Transformers

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Diagrams for cable management system.
2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:

    a. Workstation outlets, jacks, and jack assemblies.
    b. Patch cords.
    c. Patch panels.

4. Cable Administration Drawings: As specified in "Identification" Article.
5. Battery and charger calculations for central station, workstations, and controllers.

C. Product Schedules.

D. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

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. Credential card blanks, ready for printing. Include enough credential cards for all personnel to be enrolled at the site plus an extra 20 percent for future use.
2. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff an RCDD certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient conditions of 60 to 85 deg F (16 to 30 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
2. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F (2 to 50 deg C dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Outdoor Environment: NEMA 250, NEMA 250, Type 3R enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h).
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
5. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 OPERATION

A. Security access system hardware shall use a single database for access-control and credential-creation functions.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70, "National Electrical Code."

C. Comply with SIA DC-01 and SIA-DC-03

2.3 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

A. Card Readers:

1. Card-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.
2. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
3. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:

    a. Indoors, controlled environment.
    b. Indoors, uncontrolled environment.
    c. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

4. Display: Digital visual indicator shall provide visible and audible status indications and user prompts. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
5. Touch-Plate and Proximity Readers:
    a. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
    b. The card reader shall read proximity cards in a range from direct contact to at least 6 inches (150 mm) from the reader.
6. Communication Protocol: Compatible with local processor.

B. Credential Cards:

1. Modification: Entry-control cards shall be able to be modified by lamination direct print process during the enrollment process without reduction of readability. The design of the

credential cards shall allow for the addition of at least one slot or hole to accommodate the attachment of a clip for affixing the credential card to the badge holder used at the site.

2. Card Size and Dimensional Stability: Credential cards shall be 2-1/8 by 3-3/8 inches. The credential card material shall be dimensionally stable so that an undamaged card with deformations resulting from normal use shall be readable by the card reader.
3. Card Material: Abrasion resistant, nonflammable, nontoxic, and impervious to solar radiation and effects of ultraviolet light.
4. Card Construction:

    a. Core and laminate or monolithic construction.
    b. Lettering, logos, and other markings shall be hot stamped into the credential material or direct printed.
    c. Furnish equipment for on-site assembly and lamination of credential cards.

2.4 PUSH-BUTTON SWITCHES

A. Push-Button Switches: Momentary-contact back-lighted push buttons with stainless steel switch enclosures.

B. Electrical Ratings:

1. Minimum continuous current rating of 10A at 120-V ac
2. Contacts that will make 720 VA at 60 A and that will break at 720 VA at 10A.

C. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.

D. Enclosures shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.
3. Outdoors.

E. Power: Push-button switches shall be powered from their associated controller, using dc control.

2.5 CABLES

A. General Cable Requirements: Comply with requirements in Section 26519 "Low-Voltage Electrical Power Conductors and Cables" and as recommended by system manufacturer for integration requirement. Coordinate cable type with the equipment manufacturer.

B. Plenum-Rated TIA 232-F Cables:

1. Nine, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PE insulation.
3. Aluminum foil-polyester tape shield with 100 percent shield coverage.
4. Fluorinated ethylene propylene jacket.
5. Conductors are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

C. Plenum-Rated TIA 485-A Cables:

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. NFPA 70 Type: Type CMP
6. Flame Resistance: NFPA 262, Flame Test.

D. Paired, PVC, Reader and Wiegand Keypad Cables:

1. Three pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

E. Paired, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Three pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum-foil/polypropylene-tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

F. Multiconductor, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Six conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

G. LAN Cabling:

1. Comply with requirements in Section 271513 "Communications Copper Horizontal Cabling."

2.6 TRANSFORMERS

A. NFPA 70, Class II control transformers, NRTL listed. Transformers for security access-control system shall not be shared with any other system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA 606-B, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Product Schedules: Obtain detailed product schedules from manufacturer of access-control system or develop product schedules to suit Project. Fill in all data available from Project plans and specifications and publish as Product Schedules for review and approval.

D. In meetings with Architect and Owner, present Product Schedules and review, adjust, and prepare final setup documents. Use approved, final Product Schedules to set up system software.

3.2 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Construction."

B. Install cables and wiring according to requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

D. Install LAN cables using techniques, practices, and methods that are consistent with Category 5e rating of components and optical fiber rating of components, and that ensure Category 6 and optical fiber performance of completed and linked signal paths, end to end.

E. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

F. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.3 CABLE APPLICATION

A. Comply with TIA 569-D, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. TIA 232-F Cabling: Install at a maximum distance of 50 ft. (15 m) between terminations.

D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft. (1220 m) between terminations.

E. Card Readers and Keypads:

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from controller to the reader is 250 ft. (75 m), and install No. 20 AWG wire if maximum distance is 500 ft. (150 m).
3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the controller.
4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.

F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 250 ft. (75 m) between terminations.

G. Install minimum No. 18 AWG ac power wire from transformer to controller, with a maximum distance of 25 ft. (8 m) between terminations.

3.4 GROUNDING

A. Comply with Section 270526 "Grounding and Bonding for Communications Systems."

B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Bond shields and drain conductors to ground at only one point in each circuit.

E. Signal Ground:

1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
2. Bus: Mount on wall of main equipment room with standoff insulators.
3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.5 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 270553 "Identification for Communications Systems" and with TIA 606-B.

3.6 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use tester approved for type and kind of installed cable. Test for faulty connectors, splices, and terminations. Test according to TIA 568-C.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for balanced twisted-pair cables must comply with minimum criteria in TIA 568-C.1.
2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

C. Devices and circuits will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

END OF SECTION 281500

SECTION **282000**
VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
3. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
4. UPS: Sizing calculations.
5. Wiring Diagrams: For power, signal, and control wiring.

C. Design Data: Include equipment list consisting of every piece of equipment by model number, manufacturer, serial number, location, and date of original installation.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg F (16 to 29 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F

(minus 34 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h). Use NEMA 250, Type 3R enclosures.

4. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.

B. Surge Protection: Protect components from voltage surges entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.

C. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

2.2 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NECA 1.

C. Comply with NFPA 70.

D. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.

2.3 STANDARD CAMERAS

A. Color Camera:

1. Comply with UL 639.

2. Pickup Device: CCD interline transfer, 380,000 771(H) by 492(V) pixels.
3. Horizontal Resolution: 480 lines.
4. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
5. With AGC, manually selectable on or off.
6. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
7. Manually selectable modes for backlight compensation or normal lighting.
8. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
9. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
10. Motion Detector: Built-in digital.

B. Automatic Color Dome Camera: Assembled and tested as a manufactured unit, containing dome assembly, color camera, motorized pan and tilt, zoom lens, and receiver/driver.

1. Comply with UL 639.
2. Pickup Device: CCD interline transfer, 380,000 768(H) by 494(V) pixels.
3. Horizontal Resolution: 480 lines.
4. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
5. With AGC, manually selectable on or off.
6. Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
7. Manually selectable modes for backlight compensation or normal lighting.
8. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.
9. Preset Positioning: Eight user-definable scenes, each allowing 16-character titles. Controls shall include the following:

    a. In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
    b. Motion detection shall be available at each camera position.
    c. Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.

10. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
11. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
12. Motion Detector: Built-in digital.
13. Dome shall support multiplexed control communications using coaxial cable recommended by manufacturer.

2.4 LENSES

A. Description: Optical-quality coated lens, designed specifically for video-surveillance applications and matched to specified camera. Provide color-corrected lenses.

1. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions.
2. Fixed Lens: With calibrated focus ring.
3. Zoom Lens: Motorized, remote-controlled unit, rated as "quiet operating." Features include the following:

    a. Electrical Leads: Filtered to minimize video signal interference.
    b. Motor Speed: Variable.
    c. Lens shall be available with preset positioning capability to recall the position of specific scenes.

2.5 POWER SUPPLIES

A. Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, and of type as recommended by manufacturer of camera and lens.

1. Enclosure: NEMA 250, Type 4X .

2.6 CAMERA-SUPPORTING EQUIPMENT

A. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.

B. Pan-and-Tilt Units: Motorized units arranged to provide remote-controlled aiming of cameras with smooth and silent operation, and equipped with matching mounting brackets.

1. Panning Rotation: 0 to 355 degrees, with adjustable stops.
2. Tilt Movement: 90 degrees, plus or minus 5 degrees, with adjustable stops.
3. Speed: 12 degrees per second in both horizontal and vertical planes.
4. Wiring: Factory prewired for camera and zoom lens functions and pan-and-tilt power and control.
5. Built-in encoders or potentiometers for position feedback[, and thermostat-controlled heater].
6. Pan-and-tilt unit shall be available with preset positioning capability to recall the position of a specific scene.

C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.

D. Protective Housings for Fixed and Movable Cameras: Steel enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.

1. Tamper switch on access cover sounds an alarm signal when unit is opened or partially disassembled. Central-control unit shall identify tamper alarms and indicate location in alarm display. Tamper switches and central-control unit are specified in Section 283100 "Intrusion Detection."
2. Camera Viewing Window: Polycarbonate window, aligned with camera lens.

3. Duplex Receptacle: Internally mounted.
4. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.
5. Built-in, thermostat-activated [heater] [and] [blower] units. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.
6. Sun shield shall not interfere with normal airflow around the housing.
7. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.
8. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.
9. Enclosure Rating: <Insert NEMA Type designation> <Insert Ingress Protection code designation>.

2.7 COLOR MONITORS

A. Horizontal Resolution: 600 lines.

B. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, contrast, color, and tint controls.

C. Degaussing: Automatic.

D. Mounting: Single, 14-inch (356-mm), vertical, EIA 19-inch (483-mm) electronic equipment rack or cabinet complying with CEA 310-E.

E. Electrical: 120-V ac, 60 Hz.

2.8 DIGITAL VIDEO RECORDERS

A. Description: Digital, time-lapse type, full-frame and motion recorder, with removable hard drive.

1. Recording Time: 400 hours minimum.
2. Resolution: 720 by 480 lines, minimum.
3. Programming shall be from trackball and push buttons on face of the recorder, settings shall be displayed on any video monitor connected to the recorder. Programming shall include the following:

    a. Motion analysis graph.
    b. Password protection.
    c. Alarm and timer controls.
    d. Continuous recording option.
    e. Time-lapse operating modes.
    f. Search video by time, event, or motion.

4. Programming: SmartMedia card for software updating, image archiving, and image transfer to a PC.
5. Storage: 80-GB , removable hard drive. Software shall permit hot-swapping drives.
6. Compression: MPEG-2.
7. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.

8. Audio Recording: 70 to 7000 Hz. Phono and microphone input; phono output.
9. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E, or freestanding desktop.

2.9 NETWORK VIDEO RECORDERS

A. External storage or internal 250-1, 500-GB hard disk drive.

1. Video and audio recording over TCP/IP network.
2. Video recording of MPEG-2 and MPEG-4 streams.
3. Video recording up to 48 Mbps for internal storage and up to 100 Mbps for external storage.
4. Duplex Operation: Simultaneous recording and playback.
5. Continuous and alarm-based recording.
6. Full-Featured Search Capabilities: Search based on camera, time, or date.
7. Automatic data replenishment to ensure recording even if network is down.
8. Digital certification by watermarking.
9. Internal RAID storage or non-RAID storage of up to 1500 GB.
10. Capable of adding external RAID storage up to 7000 GB for models with no internal storage.
11. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.
12. Integrated Web server FTP server functionality.
13. Supports up to 16 devices.

2.10 DIGITAL SWITCHERS

A. Quad Switch: For displaying images from four cameras on a single monitor. Provide color switcher.

1. Controls: Unit-mounted front panel.
2. Resolution: [720 by 480] lines <Insert resolution>.
3. Modes: Auto, manual, and alarm. In manual mode, each channel can also be viewed in single display mode. In the event of an alarm, alarming channel shall automatically switch to full screen. If several alarms are activated, channels in alarm shall be in auto-switching mode.
4. Channel Loss Alarm: Audible buzzer; occurrence details shall be recorded.
5. Time: Indicate date and time.
6. Timing of Auto-Switcher: 1 to 30 seconds, selectable.
7. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E, or freestanding desktop.

B. Manual Switch Bank: Low-loss, high-isolation, multiple-video switch to allow manual switching of multiple quad switches and cameras to a single output. Switches shall be illuminated.

C. Sequential Switchers: Automatically sequence outputs of multiple cameras to single monitor.

1. Switching Time Interval: Continuously adjustable, 5 to 20 seconds minimum, with manual override.
2. Skip-Sequential-Hold Switch: One for each camera, with LED to indicate active camera.

3. Camera Identification Legend: Either on-screen message or label at skip-sequential switch.
4. Alarm Switching: In the event of an alarm, alarming channel shall automatically switch the monitor to full screen.
5. Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E.

D. PTZ Controls: Arranged for multiple-camera control, with switches to select camera to be controlled.

1. Pan-and-Tilt Control: Joystick type.
2. Zoom Control: Momentary-contact, "in-out" push button.
3. Automatic-Scan Control: A push button for each camera with pan capability that places camera in automatic-scanning mode.

2.11 IP VIDEO SYSTEMS

A. Description:

1. System shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
2. System shall have seamless integration of all video surveillance and control functions.
3. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
4. System design shall include all necessary compression software for high-performance, dual-stream, MPEG-2/MPEG-4 video. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
5. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
6. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
7. Encoder/decoder combinations shall place video, audio, and data network stream that can be managed from multiple workstations on the user's LAN or WAN.
8. All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.

2.12 CONTROL STATIONS

A. Description: Heavy-duty, freestanding, modular, metal furniture units arranged to house electronic equipment. Coordinate component arrangement and wiring with components and wiring of other systems.

B. Equipment Mounting: Standard 19-inch (483-mm) rack complying with CEA 310-E.

C. Normal System Power Supply: 120 V, 60 Hz, through a locked disconnect device and an isolation transformer in central-station control unit. Central-station control unit shall supply power to all components connected to it unless otherwise indicated.

D. Power Continuity for Control Station: Batteries in power supplies of central-station control units and individual system components shall maintain continuous system operation during outages of both normal and backup ac system supply.

1. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portions of system served including audible trouble signal devices for up to four hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.
2. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within 24 hours.

E. Annunciation: Indicate change in system condition and switching of system or component to backup power.

PART 3 - EXECUTION

3.1 WIRING

A. Wiring Method: Install cables in raceways unless otherwise indicated.
1. Conceal raceways and wiring except in unfinished spaces.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

C. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

D. For communication wiring, comply with the following:
1. Section 271513 "Communications Copper Horizontal Cabling."

E. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

A. Install cameras with 84-inch- (2134-mm-) minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.

B. Set pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.

C. Avoid ground loops by making ground connections only at the control station.

1. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.

D. Identify system components, wiring, cabling, and terminals according to Section 270553 "Identification for Communications Systems."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:

    a. Verify operation of auto-iris lenses.
    b. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
    c. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet (17 to 23 m) away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
    d. Set and name all preset positions; consult Owner's personnel.
    e. Set sensitivity of motion detection.
    f. Connect and verify responses to alarms.
    g. Verify operation of control-station equipment.

3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation.

C. Video surveillance system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION 282000

SECTION **283100**
INTRUSION DETECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes intrusion detection with communication links to perform monitoring, alarm, and control functions.

1.2 DEFINITIONS

A. Control Unit: System component that monitors inputs and controls outputs through various circuits.

B. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.

C. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.

D. Standard Intruder: A person who weighs 100 lb (45 kg) or less and whose height is 60 inches (1525 mm) or less; dressed in a long-sleeved shirt, slacks, and shoes.

E. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.

1. Raceway Riser Diagrams: Detail raceway runs required for intrusion detection. Include designation of devices connected by raceway, raceway type and size, and type and size of wire and cable fill for each raceway run.
2. UPS: Sizing calculations.
3. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building.
4. Master Control-Unit Console Layout: Show required artwork and device identification.
5. Device Address List: Coordinate with final system programming.
6. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
7. Details of surge-protection devices and their installation.

8. Sensor detection patterns and adjustment ranges.

C. Design Data: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are unacceptable.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Product Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

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. Intrusion Detection Devices: Furnish quantity equal to five percent of the number of units of each type installed, but no fewer than one of each type.
2. Fuses: Three of each kind and size.
3. Tool Kit: Provide six sets of tools for use with security fasteners, each packaged in a compartmented kit configured for easy handling and storage.
4. Security Fasteners: Furnish no fewer than 1 box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings and cabling administration Drawings, and field testing program development by an RCDD].
2. Installation Supervision: Installation shall be under the direct supervision of Technician, who shall be present at all times when Work of this Section is performed at Project site.

B. Testing Agency Qualifications: Certified by BICSI. Testing agency must have personnel certified by BICSI on staff.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Altitude: Sea level to 1000 feet (1220 m).
2. Master Control Unit: Rated for continuous operation in an ambient of 60 to 85 deg F (16 to 29 deg C) and a relative humidity of 20 to 80 percent, noncondensing.
3. Interior, Controlled Environment: System components, except master control unit, installed in air-conditioned interior environments shall be rated for continuous operation in ambients of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing.
4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambients of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h).
5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings shall be rated, listed, and installed according to NFPA 70.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FUNCTIONAL DESCRIPTION OF SYSTEM

A. Description: Hard-wired, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

B. Supervision: System components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.

1. Alarm Signal: Display at master control unit and actuate audible and visual alarm devices.
2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or control-unit failure.
3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or control unit.

C. System Control: Master control unit shall directly monitor intrusion detection units and connecting wiring.

D. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.

E. Operator Commands:

1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
5. Protected Zone Test: Initiate operational test of a specific protected zone.
6. System Test: Initiate system-wide operational test.
7. Print reports.

F. Timed Control at Master Control Unit: Allow automatically timed "secure" and "access" functions of selected protected zones.

G. Automatic Control of Related Systems: Alarm or supervisory signals from certain intrusion detection devices control the following functions in related systems:
1. Switch signal to selected monitor from CCTV camera in vicinity of sensor signaling an alarm.

H. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When master control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.

I. Response Time: Two seconds between actuation of any alarm and its indication at master control unit.

J. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from master control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at master control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

K. Programmed Secure-Access Control: System shall be programmable to automatically change status of various combinations of protected zones between secure and access conditions at scheduled times. Status changes may be preset for repetitive, daily, and weekly; specially scheduled operations may be preset up to a year in advance. Manual secure-access control stations shall override programmed settings.

L. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

2.2 SYSTEM COMPONENT REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Control Units, Devices, and Communications with Monitoring Station: Listed and labeled by a qualified testing agency for compliance with SIA CP-01.

C. FM Global Compliance: FM-Approved and -labeled intrusion detection devices and equipment.

D. Comply with NFPA 70.

E. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Listed and labeled by a qualified testing agency for compliance with NFPA 731.

F. Intrusion Detection Units: Listed and labeled by a qualified testing agency for compliance with UL 639.

G. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V rms injected into power supply lines at 10 to 10,000 MHz.

H. Tamper Protection: Tamper switches on detection devices, control units, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Master control-unit alarm display shall identify tamper alarms and indicate locations.

I. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to master control unit.

J. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to master control unit as an alarm signal.

K. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to master control unit.

L. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at master control unit for calibration, sensitivity, and alarm condition.

2.3 ENCLOSURES

A. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.

B. Interior Electronics: NEMA 250, Type 12.

C. Exterior Electronics: NEMA 250, Type 4X, fiberglass.

D. Screw Covers: Where enclosures are readily accessible, secure with security fasteners of type appropriate for enclosure.

2.4 SECURE AND ACCESS DEVICES

A. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

B. Key-Operated Switch: Change protected zone between secure and access conditions.

2.5 DOOR AND WINDOW SWITCHES

A. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.

B. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

C. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounted magnet and floor-mounted switch unit.

2.6 VIDEO MOTION SENSORS (INTERIOR)

A. Device Performance: Detect changes in video signal within a user-defined protected zone. Provide an alarm output for each video input.

1. Detect movement within protected zone of standard intruders wearing clothing with a reflectivity that differs from that of background scene by a factor of 2. Reject all other changes in video signal.
2. Modular design that allows for expansion or modification of number of inputs.
3. Controls:

    a. Number of detection zones.
    b. Size of detection zones.

c. Sensitivity of detection of each protected zone.

4. Mounting: Standard 19-inch (480-mm) rack as described in EIA/ECA 310-E.

2.7 MASTER CONTROL UNIT

A. Description: Supervise sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.

1. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
2. Include a real-time clock for time annotation of events on the event recorder and printer.
3. Addressable initiation devices that communicate device identity and status.

B. Construction: Freestanding equipment rack, modular, with separate and independent alarm and supervisory system modules. Alarm-initiating protected zone boards shall be plug-in cards. Arrangements that require removal of field wiring for module replacement are unacceptable.

C. Console Controls and Displays: Arranged for interface between human operator at master control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: LCD, three line(s) of 40 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
3. Control-Unit Network: Automatic communication of alarm, status changes, commands, and other communications required for system operation. Communication shall return to normal after partial or total network interruption such as power loss or transient event. Total or partial signaling network failures shall identify the failure and record the failure at the annunciator display and at the system printer.
4. Field Device Network: Communicate between the control unit and field devices of the system. Communications shall consist of alarm, network status, and status and control of field-mounted processors. Each field-mounted device shall be interrogated during each interrogation cycle.
5. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists. Include the following:

   a. Acknowledge alarm.
   b. Silence alarm.
   c. System reset.
   d. LED test.

6. Timing Unit: Solid state, programmable, 365 days.
7. Confirmation: Relays, contactors, and other control devices shall have auxiliary contacts that provide confirmation signals to system for their on or off status. Software shall interpret such signals, display equipment status, and initiate failure signals.

8. Alarm Indication: Audible signal sounds and an LED lights at master control unit identifying the protected zone addressable detector] originating the alarm.Annunciator panel displays a common alarm light and sounds a audible tone.
9. Alarm Indication: Audible signal sounds and a plain-language identification of the addressable detector originating the alarm appears on LCD display at master control unit
10. Alarm Indication: Audible signal sounds and a plain-language identification of the addressable detector originating the alarm appears on LCD display at master control unit
11. Alarm activation sounds a bell or siren and strobe.

D. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 10 percent.

E. Power Supply Circuits: Master control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 10 percent increase in load.

F. UPS: Comply with Section 263353 "Static Uninterruptible Power Supply." UPS shall be sized to provide a minimum of six hours of master control-unit operation.

G. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch (25 mm) high. Identify, with permanent labels, individual components and modules within cabinets.

H. Transmission to Monitoring Station: A communications device to automatically transmit alarm, supervisory, and trouble signals to the monitoring station, operating over a standard voice grade telephone leased line. Comply with UL 1635.

I. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

2.8 AUDIBLE AND VISUAL ALARM DEVICES

A. Bell: Master control unit 10 inches (254 mm) in diameter, rated to produce a minimum sound output of 84 dB at 10 feet (3 m) from master control unit.

1. Enclosure: Weather-resistant steel box equipped with tamper switches on cover and on back of box.

B. Klaxon Weatherproof Motor-Driven Hooter: UL listed, rated to produce a minimum sound output of 120 dB at 3 feet (1 m), plus or minus 3 dB, at a frequency of 470 Hz. Rated for intermittent use: two minutes on and five minutes off.

1. Designed for use in industrial areas and in high-noise, severe-weather marine environments.

C. Siren: 30-W speaker with siren driver, rated to produce a minimum sound output of 103 dB at 10 feet (3 m) from master control unit.

1. Enclosure: Weather-resistant steel box with tamper switches on cover and on back of box.

D. Strobe: Xenon light complying with UL 1638, with a clear polycarbonate lens.

1. Light Output: 115 cd, minimum.
2. Flash Rate: 60 per minute.

2.9 SECURITY FASTENERS

A. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.

PART 3 - EXECUTION

3.1 SYSTEM INSTALLATION

A. Comply with UL 681 and NFPA 731.

B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

3.2 WIRING INSTALLATION

A. Wiring Method: Install wiring in metal raceways according to Section 270528 "Pathways for Communications Systems." Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be 1/2 inch (13 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

C. Wires and Cables:

1. Conductors: Size as recommended in writing by system manufacturer unless otherwise indicated.

2. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
3. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable unless otherwise indicated or if manufacturer recommends shielded cable, according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
4. Data and Television Signal Transmission Cables: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

E. Install power supplies and other auxiliary components for detection devices at control units unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

F. Identify components with engraved, laminated-plastic or metal nameplate for master control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 270553 "Identification for Communications Systems."

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with identification requirements in Section 270553 "Identification for Communications Systems."

B. Install instructions frame in a location visible from master control unit.

3.4 GROUNDING

A. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.

B. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide [5] <Insert value>-ohm ground. Measure, record, and report ground resistance.

D. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Section 270526 "Grounding and Bonding for Communications Systems."

3.5 FIELD QUALITY CONTROL

A. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections: Comply with provisions in NFPA 731, Ch. 9, "Testing and Inspections."

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
2. Test Methods: Intrusion detection systems and other systems and equipment that are associated with detection and accessory equipment shall be tested according to Table "Test Methods" and Table "Test Methods of Initiating Devices."

D. Documentation: Comply with provisions in NFPA 731, Ch. 4, "Documentation."

E. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the intrusion detection system. Comply with documentation provisions in NFPA 731, Ch. 4, "Documentation and User Training."

END OF SECTION 283100

SECTION 28 46 21.11
ADDRESSABLE FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section. Division-26 Electrical Sections apply to work of this Section.

A. It is the intent of this specification to provide an individual complete and operational low voltage, time-division multiplexed, addressable intelligent voice evacuation fire alarm system as described herein. The system shall include, but not be limited to: control panels and power supplies, standby power supply and battery, alarm initiating and indicating appliances and devices, monitor and supervision devices, system wiring, and accessories required to provide and install a complete and software operational system. All equipment and installation shall comply with the requirements of these specifications and the related Drawings. Items specified by either shall be as if specified by both. The individual system specified herein shall be networked as described herein.

B. The equipment and installation shall comply with the current provisions of the following standards:

National Fire Protection Association Standards:
NFPA 70 National Electric Code
NFPA 72 National Fire Alarm Code
NFPA 101 Life Safety Code
Underwriters Laboratories Inc.

Underwriters Laboratories Inc. for use in fire protective signaling systems shall list the system and all components. The UL Label shall be considered as evidence of compliance with this requirement. The equipment shall be listed by UL under the following standards as applicable:

UL 864/UOJZ, APOU	Control Units for Fire Protective Signaling Systems.
UL 1076/APOU	Proprietary Burglar Alarm Units and Systems.
UL 268	Smoke Detectors for Fire Protective Signaling Systems.
UL 268A	Smoke Detectors for Duct Applications.
UL 521	Heat Detectors for Fire Protective Signaling Systems.
UL 228	Door Holders for Fire Protective Signaling Systems.
UL 464	Audible Signaling Appliances.
UL 1638	Visual Signaling Appliances.
UL 38	Manually Activated Signaling Boxes.
UL 1971	Visual Signaling Appliances.
UL 1481	Power Supplies for Fire Protective Signaling Systems.
UL 1711	Amplifiers for Fire Protective Signaling Systems.

Any equipment not bearing a UL Label shall be removed and replaced with labeled equipment at the Contractors' expense.

Americans with Disabilities Act (ADA)

In the case of any discrepancy between these specifications, the project drawings, and any applicable local codes, the installed Fire Alarm System shall comply with the most stringent requirement.

C. The system and all components shall be listed by Underwriter's Laboratories for specific application as fire alarm equipment. The UL label shall be prima facie evidence of compliance with this requirement. Any equipment not bearing a UL label will be unacceptable and will be removed and replaced with labeled equipment at the Contractor's expense.

1.2 SUBMITTALS:

A. Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow. Complete data sheets bearing the printed logo or trademark of the fire alarm control panel manufacturer for the following equipment:

1. System Control Panel.
2. System Power Supply.
3. Standby Power Supply.
4. Each type of automatic smoke detector and fire detector.
5. Manual alarm initiating station.
6. Audible/Visual alarm indicating appliances.
7. Voice Evacuation Equipment
8. Any other items required by the Project Drawings or Specifications.

B. Evidence of listing of all proposed equipment by UL for application as fire alarm equipment.

C. Submit a scaled "point-to-point" wiring diagram showing the connections to the equipment and terminal cabinets. Indicate the equipment numbers, terminal numbers, wire numbers, zone numbers, wire colors, junction box sizes, and conduit sizes. Include the connections for the Mechanical Systems and the Fire Detection and Alarm System. The submittal shall be made for approval prior to the installation of the wiring in the raceways. Make a clear statement that all circuits shall be terminated on terminal strips and that wire nuts will not be allowed. Electronic floor plans are available from the Architect.

D. A custom wiring diagram for the building showing wiring to each individual appliance and device.

E. Submit voltage drop calculations for all alarm circuits.

F. Submit battery calculations for the fire alarm panel with all devices under supervisory and alarm conditions.

G. Evidence of certification of the proposed fire alarm Contractor by both the State of Florida Department of Professional Regulation.

H. Written certification by the fire alarm Contractor that no power supply or circuit on the system has an electrical load greater than 80% of its rated capacity.

I. No equipment shall be purchased by the Contractor for the fire alarm system until the Architect has approved the above submittals in entirety and returned them to the Contractor.

J. It is the Contractor's responsibility to meet the entire intent of the specifications. Approved submittals shall only allow the Contractor to proceed with the installation and shall not be construed to mean that the Contractor has satisfied the requirements of these specifications.

K. The contractor shall provide the following:

1. Hourly, Non-Standard, Holiday, and Overtime Service Rates.
2. Semi-Annual inspection rates. These services are to be performed by factory trained and authorized personnel, for this installed System with the submittal. These hourly service rates shall be guaranteed for a three-year period beyond the three-year warranty period. The Contractor shall also provide Annual Inspection Rates for System Testing in compliance with NFPA 72 requirements for three years of system operation. Proof of the level of factory training and authorization of the servicing Contractor shall be included in the submittal.
    a. Evidence of listing by Underwriters' Laboratories for all proposed equipment for use as Fire Alarm equipment. (Ref.: Underwriters' Laboratories, Section UOJZ).
    b. A Single Line System Block Diagram and written System Operational Overview.
    c. Complete calculations showing the electrical load on the following system components:
        1) Each system Power Supply
        2) Each standby Power Supply (batteries)
        3) Each Notification Appliance Circuit.
        4) Each auxiliary control circuits that draw power from any system power supply.
    d. Field Connection Drawings: A complete set of drawings, one for each Fire Alarm Control Panel module which has any external (field) wiring connected to it, and one for each system detector, module or signaling appliance, shall be supplied. The Field Connection Drawings shall be done under AutoCAD Version 2020 or later. They shall be provided on computer diskette and in paper format. Building floor plans of contract sheets will be furnished on diskette to the Contractor by the Architect without charge.
    e. Warranty Statement from the manufacturer shall be provided as part of the submittal package. This warranty statement will state a 3 year period of warranty for all of the products proposed for the project, and shall include the name and address of the authorized manufacturers' agent who will honor any and all warranty claims.
    f. Written Certification by the Fire Alarm Contractor that no power supply or circuit in the system has an electrical load greater than 80% of its rated capacity.
    g. A scaled plan of building showing the placement of each individual item of fire alarm equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

1.3 QUALITY ASSURANCE:

A. Each and all items of the fire alarm system shall be listed as a product of a single fire alarm manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL Category UOJZ as

a single control unit. Partial listing will not be acceptable.

B. All control equipment shall have transient protection devices to comply with UL 864 requirements.

C. Manufacturer's Qualifications: All fire alarm equipment shall be the product of one manufacturer. System appliances and devices not manufactured by the control panel manufacturer shall be products regularly distributed by the control panel manufacturer and cross-listed by Underwriter's Laboratories for compatibility with the system control panel.

D. Installer's Qualifications: The installation and testing of all components of the system shall be performed by a Contractor holding a current certification issued by the State of Florida Department of Professional Regulation. The Contractor shall be certified as either an Alarm System Contractor – Type 1 or an Unlimited Electrical Contractor.

F. The fire alarm Contractor shall be an experienced firm regularly engaged in the layout and installation of automatic fire alarm systems. The Contractor shall have successfully completed the installation, testing, and warranty of systems of the scope of the largest system on this project at least three years prior to bid, and have regularly engaged in the business of fire alarm systems contracting continuously since.

G. The fire alarm Contractor shall have been certified by the State of Florida Department of Professional Regulation to install fire alarm systems, have been NICET Level III certified, and certified by one of the above listed approved equipment manufacturer to perform installation, testing, adjustment, maintenance, and repair on the approved manufacturer's equipment prior to the date of bid. The proposed fire alarm Contractor shall commence no work on the project until he furnishes evidence, satisfactory to the aforementioned certifications and receives notice to proceed with the installation from the Architect.

H. Firms shall have been factory authorized service organization and stock spare parts.

1.4 WARRANTY AND MAINTENANCE:

A. The Contractor shall supply a 3-year warranty from date of commissioning for all Control System and Field Devices and appliances. The Contractor shall warrant the installed fire alarm system to be free from defects of material and installation for a period of 3 years from acceptance by the Architect. Any deficiencies shall be immediately corrected at no additional cost to the Owner. The Contractor shall maintain a service organization with adequate spare parts stock within 150 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the Owner notifying the Contractor. Other defects shall be repaired within 48 hours of the Owner notifying the Contractor.

B. The Factory Trained and Authorized Contractor who Designed and Installed this system shall provide a separate maintenance contract for a period of 3 Years from the date of system warranty expiration. As part of the systems maintenance, the installing Contractor will provide printed out reports which detail the sensitivity of each smoke detector installed in the system, and the date of the report.

C. The Fire Alarm System supplied shall include a store of spare system sub-assemblies and field devices for use as emergency service stock. As a minimum, the spares stock shall include 2% of each different type of field connected device.

PART 2 - PRODUCTS

This Fire Alarm System Specification must be conformed to in its entirety to ensure that the installed and programmed System will function as designed, and will accommodate the future requirements and operations required by the building Owner. All specified operational features will be met without exception.

2.1 SYSTEM OVERVIEW AND DESCRIPTION:

A. The Fire Alarm System supplied under this specification shall be a microprocessor-based direct wired peer to peer network system. The system shall utilize independently addressed, and microprocessor-based smoke detectors, heat detectors, and modules as described in this specification.

B. All Fire Alarm equipment shall be arranged and programmed to provide an integrated system for the early detection of fire, the notification of individual system building occupants, the automatic summoning of the local Fire Department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of fire and to facilitate the safe evacuation of building occupants

C. The fire alarm equipment shall be installed in the locations shown on the project drawings.

D. The fire alarm system shall be fully supervised for the detection and reporting of the derangement of any component or circuit on the system. Signaling Line Circuits shall provide the level of performance designated as, Style 7 by UL and the NFPA. Indicating circuits shall provide the level of performance designated as Style Y by UL and the NFPA.

E. The fire alarm system shall be microprocessor driven with stored program controllers. Each panel node on the network shall use a multiple microprocessor design so that the failure of a single microprocessor will not result in a local failure. Fire alarm systems that utilize only one microprocessor for system and SLC control will not be accepted.

F. The fire alarm system shall operate from direct current having a nominal potential of 24 volts. The direct current shall be provided by a solid-state power supply connected to the building electrical system by a dedicated branch circuit in strict compliance with Articles 725 and 760 of the NEC, and these specifications.

G. A standby power supply shall automatically supply electrical energy to the system whenever the primary power supply fails to provide the minimum voltage required for proper system operation. The standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for 24 Hours in Standby and then be capable of operating the system for 5 Minutes in the alarm mode. The fire alarm system shall include a charging circuit to automatically maintain the electrical charge of the battery. The fire alarm system shall include the alarm initiating and indicating appliances and devices shown on the project drawings.

H. All Control Panel Assemblies and the connected Automatic and Manual Alarm and Field Notification Appliances shall be designed and manufactured by the same company, and shall be tested and cross-listed as compatible (UOJZ) to ensure that a fully functioning system is designed and installed.

I. Provide and install all required equipment and accessories necessary for the proper opera

tion of the system.

2.2 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS:

All equipment furnished for this project shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use and shall be provided by a single manufacturer.

A. The manufacturer's representative and a verification certificate presented upon completion shall verify system installation and operations. The manufacturer's representative shall be responsible for an on-site demonstration of the operation of the system and initial staff training as defined by this specification.

B. The system shall include a manner to display field device topology.

C. In addition, As-Built riser and wiring diagrams reflecting all terminations, each programmed device characteristic including detector type, base type, serial number, sensitivity setting and wire configurations will be provided to the Architect, based on the information gathered during the verification process described above. The fully executed sworn affidavit (at the back of this section) will be provided to the Architect with the As-Built riser and wiring diagrams verifying their accuracy.

D. It shall be possible for authorized service personnel to change the personality/function of the connected intelligent devices to meet changes in building layout or environment.

E. Equipment and material furnished shall comply with the latest revisions of applicable codes and standards of Underwriters Laboratories, Inc., ANSI, NEMA and NFPA and shall be listed, approved and labeled for the applications. Except as noted, all system components shall be built and tested by the same manufacturer, providing a single source or responsibility.

1. Approved Manufacturers:
    a. Basis of design: Edwards EST4 Series
    b. Approved Equal: Submit substitutions to engineer for consideration.

2.3 FIELD PROGRAMMING:

The system shall be programmable, configurable, and expandable in the field without the need for special tools or PROM programmers and shall not require replacement of memory ICs. All programs shall be stored in non-volatile memory. The programming function shall be entered with a special password that may be changed in the field to a new value at any time by entering the old password and requesting a password change.

2.4 CONTROL PANEL OVERVIEW:

The Fire Alarm System shall be a Multi-Processor Based Network System designed specifically for Fire and Security applications. The System shall be UL listed under Standards 864 (Control Units for Fire-Protective Signaling Systems) under categories UOJZ and APOU. The specified modules shall also be listed under UL 1076 (Proprietary Burglar Alarm Units and Systems) under category APOU. All new devices and circuits shall be ad

dressable. The new panel shall have sufficient battery capacity to handle all new devices with a 50% reserve.

A. The System shall include all required hardware and system programming to provide a complete and operational system, capable of providing the protected premises with the following functions and operations:

1. All System operational software is to be stored in non-volatile memory. Systems that utilize dynamic RAM or static RAM for program storage are unreliable and will not be accepted.
2. Control Panel disassembly, and replacement of electronic components of any kind shall not be required in order to upgrade the operations of the installed system to conform to future application code and operating system changes.
3. System response to any alarm condition must occur within 3 seconds, regardless of the size and the complexity of the installed system.
4. All initial system programming, as well as all any changes made to the system programming during the start-up and system acceptance phase, shall be made electronically, and shall not require the use of diode matrices or other hardware destructive means. All changes shall be fully documented in the as-built documentation package. Systems which store initial programming or field programming changes in battery backed memory shall not be accepted
5. The system shall allow the testing of the entire installed system (Walk Test) dependent only on the needs of the testing agency, and of the occupancy requirements of the building. The testing of the installed system shall not be defined or limited by the physical layout of the Fire Alarm System, or its application to the protected premises.
6. The Fire Alarm System shall utilize Surface Mount Technology in its internal elements to increase reliability of each system component, and the system as a whole.
7. Ground Faults localized to the network node. If ground faults occur on the field wiring of the system, then the electrical location of those field-wiring faults shall be identified and annunciated to the network node, electronic loop controller, or the device where the fault has occurred.
8. All of the operational interface hardware needed to allow the system to function, as a network, shall be included with the Fire Alarm System. No additional interfaces or electronic modules shall be required to enable the system to function as a true network.
9. The Control of any or all of the System Common Control Functions shall be automatically routed, through the system operational program, to any node of the installed system as an automatic function of the time of day and/or date.

2.5 VOICE EVACUATION EQUIPMENT:

A. Integrated Audio: The Fire Alarm System shall incorporate a true digital integrated audio system into the network, multiplexing 4 independent audio channels over a single pair of wires. The system shall include distributed audio amplifiers, one for each speaker circuit, for system survivability. Tone generators shall also reside in each amplifier cabinet in case of message failure. The backup tone shall be a temporal tone to allow evacuation signals to be broadcast in the protected premises in the event of a loss of data communication from the multiplexed audio riser.

2. A digital message unit shall be provided which provides up to 15 minutes of prerecorded emergency messaging. The message contained in the fully digital message

unit shall be recordable and changeable in the field on a computer. Keying of either microphone shall allow a live evacuation announcement

B. Audio Source Unit:

1. The Fire Alarm System shall be provided with the fully integrated Emergency Communications System. The Emergency Communications System shall include a paging microphone at the FACP and a remote microphone in the main theatre sound booth, digital message playback unit, and 4 fully digitized and multiplexed Audio Channels. Four dedicated page mode control switches shall provide the emergency operator with instantaneous one touch paging to safely control the staged evacuation of building occupants. Automatic programming shall dynamically group the most frequently targeted paging zones.
   a. The “All Call” switch will direct the manual page to the entire facility.
   b. The “Page to Evac” switch will direct the manual page to those building are as automatically receiving the Evacuation Signal.
   c. The “Page to Alert” switch will direct the manual page to those building are as automatically receiving the Alert Signal.
   d. The “All Call Minus” switch will direct the manual page to those building areas which are programmed to receive the auxiliary and general channel connections such as stairwells
2. The system shall have paging control switches and LEDs to support specific zone selection as shown on the plans. The zone control / displays shall confirm amplifier selection and annunciate amplifier and amplifier circuit trouble.
3. The system shall automatically deliver a preannounce tone of 1000 Hz for three seconds when the emergency operator presses the microphone talk key. Either at the FACP or the remote microphone in the main theater sound booth. A ‘ready to page’ LED shall flash during the preannounce and turn steady when the system is ready for the user’s page delivery.
4. The system shall include a page deactivation timer, which activates for 3 seconds when the emergency user releases the microphone talk key. Should the user subsequently press the microphone key during the deactivation period, a page can be delivered immediately. Should the timer complete its cycle the system shall automatically restore emergency signaling and any subsequent paging will be preceded by the pre-announce tone. A VU display shall display voice level to the emergency operator.

C. Audio Amplifiers:

1. Each audio power amplifier shall have integral audio signal de-multiplexers, allowing the amplifier to select any one of eight digitized audio channels. The channel selection shall be directed by the system software. Up to 4 multiple and different audio signals must be able to be broadcast simultaneously from the same system network node.
2. Each amplifier output shall include a dedicated, supervised 25 Vrms speaker circuit that is suitable for connection of emergency speaker appliances. Each amplifier shall also include a notification appliance circuit rated at 24Vdc @ 3.5A for connection of visible (strobe) appliances. This circuit shall be fully programmable and it shall be possible to define the circuit for the support of audible, visible, or ancillary devices.
3. Standby Audio amplifiers shall be provided that automatically sense the failure of a primary amplifier, and automatically program themselves to select and de-multiplex

the same audio information channel of the failed primary amplifier, and fully replace the function of the failed amplifier.

4. In the event of a total loss of audio data communications, all amplifiers will default to the local “EVAC” tone generator channel. If the local panel has an alarm condition, then all amplifiers will sound the EVAC signal on their connected speaker circuits.
5. In the event of a loss of the fully digitized, multiplexed audio riser, the audio amplifiers shall automatically default to an internally generated alarm tone, which shall be operated at a 3-3-3 temporal pattern.
6. Audio amplifiers shall automatically detect a short circuit condition on the connected speaker circuit wiring, and shall inhibit it from driving into that short circuit condition.
7. The Audio System shall include sufficient battery standby for 5 minutes of alarm after a 24-hour building power failure.

2.6 CONTROL PANEL OPERATION:

A. When an alarm condition is detected by one of the systems initiating devices, the following functions shall immediately occur:

1. The system alarm LED shall flash.
2. The local sounding device in the panel shall be activated.
3. The LCD display shall indicate all pertinent information associated with the alarm and its location.
4. The appropriate status change message shall be sent to the central station by an integral digital communicator.
5. All automatic programs assigned to the alarm point shall be executed and the associated indicating devices and relays addressed and activated.

B. Operation of any manual or automatic initiating device shall sound all alarm signals and shall also sound an alarm and indicate the zone activated on the fire alarm annunciator panels. Flashing light at each audible alarm shall operate with the audible alarm device.

C. Operation of any manual or automatic initiating device shall shut down air handling units. Locations shall be as shown on the Drawings.

D. Malfunction of supervised circuits shall indicate as "Trouble" on the fire alarm annunciator panels. An audible and visual signal shall indicate trouble with provisions to silence the audible signal but not the visual indication.

E. Operation of the fire alarm system and "Trouble" shall operate the necessary contacts that may be connected via telephone lines to remote locations.

F. When a trouble condition is detected by one of the system initiating devices, the following functions shall immediately occur:

1. The system trouble LED shall flash.
2. A local sounding device in the panel shall be activated.
3. The 80-character LCD display shall indicate all pertinent information associated with the trouble condition and its location.

2.7 FUNCTIONAL OPERATION OF THE FIRE ALARM SYSTEM:

A. Alarm detection: When a fire alarm condition is detected by one of the system initiating devices, the following functions shall immediately occur:

1. The System alarm indicator shall flash continuously.
2. A local sounding device in the panel shall be activated.
3. The control panel display shall indicate all pertinent information associated with the alarm and its location.
4. All automatic programs assigned to the alarm point shall be executed and the associated indicating appliance circuits and control relays addressed and activated.

B. System trouble detection: When a trouble condition is detected by one of the system initiating devices, the following functions shall immediately occur:

1. The System Trouble indicator shall flash.
2. A local sounding device in the panel shall be activated.
3. The control panel display shall indicate all pertinent information associated with the trouble condition and its location.
4. However, unacknowledged alarm messages shall have priority over trouble messages, and if such an alarm must also be displayed, the trouble message shall not be displayed until the operator has acknowledged all alarm messages.

C. Short circuit fault isolation: The system shall contain a method of isolating wire-to-wire short circuits on an SLC loop in order to limit the number of detectors or elements that are incapacitated by the short circuit fault. If a wire-to-wire short occurs, the system shall automatically disconnect a downstream segment of the SLC that contains the short circuit fault. When the short is corrected, the isolated section of the SLC loop shall automatically be reconnected to the SLC and full communication between the control panel and all affected devices restored.

D. Control switch operation: The system control panel shall provide at least the following switches for system control:

1. Acknowledge Switch: Activation of the control panel Acknowledge switch in response to a single new trouble or alarm condition shall silence the panel sounding device and change the System Alarm or Trouble LEDs from flashing to steady-ON. If additional new alarm or trouble conditions exist in the system, activation of this switch shall scroll the display to any queued subsequent alarm or trouble conditions that exist, and shall not silence the local audible device or change the LEDs to steady until all queued conditions have been so acknowledged. New alarm conditions shall always be displayed before new trouble conditions. Activation of the Acknowledge switch shall also cause a corresponding message to be displayed on System displays and Printers.
2. Signal Silence Switch: Activation of the Signal Silence Switch shall cause all appropriate indicating appliance circuits and relays to return to the normal condition after an alarm condition. The selection of indicating appliance circuits silenced by this switch shall be fully programmable from the system control panel. The system shall also include a means through system programming to allow for signal silences inhibit time.
3. System Reset Switch: Activation of the System Reset Switch shall cause all initiating devices, indicating appliance circuits, and associated output devices to return to the normal condition. If alarm conditions exist in the system after the System Reset Switch activation, the system shall then repeat the alarm sequence.

4. Lamp Test Switch: Activation of the Lamp Test Switch shall turn on all LED indicators, system graphic display, and then return all indicators to the previous condition.

2.8 SERVICE/TESTING AIDS:

A. Automatic detector test: The system shall include a Resident Automatic Detector Sensitivity Test, which satisfy the NFPA and UL requirements for detector sensitivity test. No additional calibrated tests are required if the system indicates the smoke detectors are with in the normal sensitivity range.

B. Watch-dog circuits: The system shall include "Watch-Dog" circuits to detect and report failure of any microprocessor circuit, memory, or software.

C. Field programming: The system shall be totally programmable, configurable and expandable via programming. Systems which require special tools, PROM programmers, or replacement of software media to effect permanent program changes will not be accepted. All programs shall be stored in non-volatile memory. The programming function shall be accessed via a special password, which shall be selected when the system is installed. The password shall be changeable in the field at any time by entering the old password and requesting a password change. All software shall be supplied with the system so that the Owner may fully program and maintain the system.

2.9 FIRE ALARM SYSTEM OPERATORS' INTERFACE:

A. The system display: The display shall provide the means to inform the System Operator with detailed information about the off-normal status of the installed Fire Alarm System. The LCD display shall automatically respond to the status of the system, and shall display that status in 80-character front panel display.

B. Automatic functions: The following status functions shall be annunciated by the LCD Display:

1. When the Fire Alarm System is in the "Normal" Mode, the panel displays:
   a. The current Date and Time.
   b. A Custom System Title (minimum 2 lines X 21 characters).
   c. A summary total of system events.
2. With the Fire Alarm System in the "Alarm" Mode, the display shall automatically reconfigure into four logical windows.
   a. Systems Status Window: The DISPLAY shall show the system time and the number of active points and disabled points in the system in this section of the DISPLAY.
   b. Current Event Window: The DISPLAY shall show the first active event of the highest priority in reverse text to highlight the condition to the Emergency Operator. The top line of the reversed text shall show the sequence number in which the displayed event was received, as well as its event type. The second and third lines of reversed text shall display an identification message related to the displayed event.
   c. Last Event Window: The DISPLAY shall show the most recent, highest priority event received by the system.
   d. Type Status Window: The DISPLAY shall show the total number of active events in the system, by event type. There shall be four different System

Event Types which shall be displayed, “Alarm Events”, “Supervisory Events”, “Active Trouble Events”, and “Active Monitor Events”.

2.10 System protected premises circuit interface: An Electronic Loop Controller (SLC) shall be provided in each Fire Alarm Control Panel (where needed), to interface between the panel and the Analytical Microprocessor-based Detectors and modules. On each electronic loop controller in the system there shall be a minimum of 20 spare sensor addresses and 20 spare module addresses for future expansion.

A. The communications format used by this controller shall be 100% digital. Communications between the Fire Alarm Control Panel and the Analytical Microprocessor-based Detectors and modules shall incorporate both BROADCAST POLLING and DIRECT ADDRESS SEARCH (serial polling communication) methods for increased integrity and decreased system response time.

B. The Electronic Loop Controller (SLC) shall communicate to the connected detectors and modules utilising any wiring material or method complying with Chapter 3 of the National Electrical Code (ANSI/NFPA 70-1996). The Electronic Loop Controller shall not require special cables or home run connections to operate. “T” Tapping and parallel wiring shall be permitted on those Signalling Line Circuits designated as Style 4.

C. It shall be possible to connect the electronic loop controller to the Analytical Microprocessor-based Detectors and modules as Style 4 circuits without the use of special shielding, twisted wire, or conduits. It must be possible to wire branch circuits (T-Taps) from Style 4 Circuits. Each Electronic Protection Loop can be configured to operate as a Style 7 loop without the need for additional hardware modules.

D. The electronic controller, through the system program, shall provide the ability to set the sensitivity and alarm verification time of each of the individual Analytical Microprocessor-based Detectors on the circuit. It shall be possible to automatically set the sensitivity of each of the individual intelligent detector for day and night periods.

E. All system programming and history shall be permanently stored in non-volatile memory to ensure that no programming or history is lost. Systems which store initial programming or field programming changes in battery backed memory shall not be accepted.

F. The Electronic Loop Controller shall be capable of addressing all Analytical Microprocessor-based Detectors and modules connected to it electronically, without the need to set switches at any of the individual devices.

G. The Electronic Loop Controller shall provide a minimum of 5 levels of supervision for each smoke detector on the circuit:

1. Device Location
2. Unexpected Device Add/Delete
3. Missing Device Address
4. Changes in the Physical Wiring of the Loop Circuit
5. Changes in Device Personalities

H. The Electronic Loop Controller (SLC) shall detect the electrical location of each connected detector and module. The location and type of each connected device shall be mapped and

stored in memory in the loop controller. It shall be possible to access and display this map at any time.

I. The Electronic Loop Controller shall be capable of reporting any additional device addresses, which may have been added to the circuit, and/or changes that may have been made to the wiring in the data circuit. A specific trouble shall be reported for any and all off-normal non-alarm condition.

J. The Electronic Loop Controller (SLC) shall be able to report the following information on a per addressable device basis.

1. Device Address
2. Device Type
3. Current Detector Sensitivity Values and the Extent of Environmental Compensation for smoke detectors.
4. Specific trouble codes to diagnose device / wiring faults.
5. Cumulative Number of Alarms and Troubles.
6. Date of Last Alarm.
7. Alarm Verification Cycle Count.
8. Date of Last Maintenance for the Device.

K. The Electronic Loop Controller shall notify the System Operator when any connected smoke detector reports a “Routine Maintenance Required” signal to the system.

L. If an Electronic Loop Controller should fail to communicate, the circuit shall automatically switch into the stand alone alarm mode. In the stand-alone alarm mode, the circuit shall be capable of producing a loop alarm if any of the connected alarm type intelligent devices become active.

M. To enhance the survivability of the entire installed Fire Alarm System, all Electronic Loop controllers shall be located no more than 1 floor away from the area which they are applied to protect.

2.11 Hard wired nac circuits: Provide where indicated on the plans supervised hard-wired Notification Appliance Circuits (NAC) for the control of 24Vdc signaling appliances. Each NAC shall operate as a Class B (Style Y) circuit, and shall be capable of controlling up to 3.5 amps of signaling power.

A. Provide where indicated on the plans supervised hard-wired Notification Appliance Circuits (NAC) for the control of 70.7Vrms Audio Signaling Appliances. Each NAC shall operate as a Class B (Style Y) circuit, and shall control up to 35 Watts of signaling power.

B. Provide where indicated on the plans supervised hard-wired Notification Appliance Circuits (NAC) for the control of 25Vrms Audio Signaling Appliances. Each NAC shall operate as a Class B (Style Y), and shall control up to 50 Watts of power to the circuit.

C. Panel NACs shall be power limited to 3.5A at 24Vdc and 4.1A at 20.4Vdc to support higher current demand by visible appliances at lower battery voltages.

2.12 SYSTEM PROGRAMMABLE OPERATIONS: System Message Processing and Display Operations:

A. The routing of all network annunciation and control parameters shall be configurable to any or all nodes in the network manually, or automatically as a function of the time of day or date.

B. All of the system Printer ports can be configured to display any or all of the following functions:

1. Alarm
2. Supervisory
3. Trouble
4. Monitor
5. Service Group

C. Each Display located anywhere in the system shall be configurable to show the status of any or all of the following functions pertaining to any point anywhere in the entire network system:

1.Alarm
2.Supervisory
3.Trouble
4.Monitor

D. The system shall provide the capability to label each point in the system with up to 256 characters of custom message.

E. The system shall have the capability to provide up to 128 logical “Counting AND” Groups. Each group shall have a programmable ‘activation’ number. Whenever the number of active devices in an AND Group reaches the activation number, the AND Groups’ rules will execute. It shall be possible to ‘overlap’ AND groups by having devices appear in more than one group.

F. The system shall have the ability to define a minimum of 128 Matrix Groups with up to 250 points in each group. For each matrix, it shall be possible to define a ‘radius’ and an ‘activation’ number. The radius number defines the proximity between detector locations. When two detectors activate at or within the value of the ‘radius’ or whenever the number of active devices reaches the activation number the Matrix Group activates. It shall be possible to ‘overlap’ Matrix groups by having devices appear in more than one group.

G. The system shall include the ability to define an alternate set of device commands which may be used in combination with the system test command for the testing of the connected Intelligent Smoke Detectors. This function shall disable the normal alarm command for each of the members of the group, so that the testing process will not result in an activation of the building evacuation signals, auxiliary relays or central station connections.

H. The system shall include Time Control functions which will have the ability to control any system output or function, or initiate any system operational sequence as a function of the Month, Day of Week, Date, Hour, Minute, or Holiday.

I. The system shall provide the ability to download data from the intelligent systems Detectors to a P.C. while the system is on-line and operational in the protected premises. The downloaded data may then be analyzed in a diagnostic program supplied by the system manufacturer.

2.13 FIELD MOUNTED SYSTEM COMPONENTS:

A. Analytical Microprocessor-based Detectors - General Operation The System shall use Analytical Microprocessor-based Detectors that are capable of full digital communications with the Fire Alarm System using both broadcast and polling communications protocols. Each detector shall be capable of performing independent advanced fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combines different fire parameters to increase reliability and distinguish real fire conditions from unwanted nuisance alarms caused by environmental events. Signal patterns that are not typical of fires shall be eliminated by digital filters and shall not cause a system alarm condition. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable.

B. Each smoke detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detectors' memory. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total loop response time for detectors changing state (alarm or trouble) shall be 0.5 seconds.

C. Each smoke detector shall have a separate means of displaying system communication and detector alarm status. A green LED shall flash to confirm communication with the system through the electronic loop controller. A red LED shall flash to indicate that the detector is in alarm. If communications between the detector and the electronic loop controller is lost, both LED's will illuminate steady to indicate an alarm in the "standalone mode". Both LEDs shall be visible through a full 360 degree viewing angle.

D. Each smoke detector shall be capable of identifying diagnostic codes to be used for system maintenance. All diagnostic codes shall be stored in the detector.

E. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals to the Fire Alarm Control Panel via the Electronic Loop Controller. It shall be possible to program Fire Alarm Control Panel activity and response to each of the following signal levels:

1. Normal
2. Pre-Alarm
3. Alarm
4. Trouble
5. Detector Need Cleaning

F. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings.

G. Each smoke detector microprocessor shall contain an environmental compensation algorithm, which identifies and sets ambient "Environmental Thresholds" continually and periodically. In this manner, the environmental impact of temperature, humidity, environmental contaminates as well as detector aging shall be automatically monitored. This process shall employ digital compensation techniques to adapt the detector to both long term and short term changes in the environment in which they are installed. The microprocessor shall monitor this environmental compensation value and alert the system operator when the detector 80% of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and

the derived base line sensitivity that the detector has sensed in its environment. The base line sensitivity information shall be automatically and periodically updated and permanently stored in the detector.

H. The Analytical Microprocessor-based Detectors together with the Electronic Loop Controller shall provide increased system reliability and inherent survivability through intelligent standalone conventional alarm operation. The detectors shall automatically change to standalone conventional device operation in the event of an electronic loop controller communications failure. In the standalone conventional detector mode, the micro-processor-based detector shall continue to operate using sensitivity and environmental compensation information stored in its microprocessor at the time of the communications failure. The electronic loop controller shall continue to monitor the communications loop and activate a loop alarm if any of the connected analytical microprocessor based detectors reach their stored alarm sensitivity threshold.

I. Each detector shall be capable of automatic electronic addressing and/or custom addressing without the use of DIP or rotary switches, and shall mount on a common base to allow the simple replacement of one detector type with another detector type. The addressing of the detectors shall not depend on the electrical position of the detector on the circuit.

2.14 ANALYTICAL MICROPROCESSOR-BASED DETECTORS - FIXED TEMPERATURE HEAT DETECTOR:

A. The intelligent heat detector shall have a solid-state heat sensor, and shall transmit an alarm at a fixed temperature of 135° F (57°C). The detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on its' analysis of the area of installation. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications

B. Systems using central processing methods to monitor the inputs from a circuit of analog sensors to detect a fire will not be accepted.

2.15 ANALYTICAL MICROPROCESSOR-BASED DETECTORS - PHOTOELECTRIC SMOKE DETECTOR:

A. The Analytical Microprocessor-based photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to detect visible particulates produced by combustion. The integral microprocessor shall dynamically examine values from the sensor and initiate a system alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the detectors' memory and shall be trans

ferred to the electronic loop controller for retrieval using a laptop PC or the Intelligent Detector Program/Service Tool designed by the manufacturer specifically for the purpose. The photoelectric smoke detector shall be rated for area applications when installed at a minimum of 30 ft (9.1m) centers and shall be suitable for wall mount applications. The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 5,000 ft/min (0-25.39 m/sec) without requiring specific duct detector housings or sampling tubes.

B. The alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5% smoke obscuration per foot. The photo detector shall be suitable for operation in the following environment:

1. Temperature: 32°F to 120°F (0°C to 49°C)
2. Humidity: 0-93% RH, non-condensing
3. Elevation: no limit

C. In the event of a loss of communications of the smoke detector with the Electronic Loop Controller, the smoke detector will automatically revert to the “Standalone Conventional” operation, and Fire Alarm System functions shall not be compromised.

2.16 ANALYTICAL MICROPROCESSOR-BASED DETECTORS - MOUNTING BASES:

A. All Analytical Microprocessor-based Detector mounting bases shall provide a means to mount the detector to a [North American 1-gang, 3½” or 4” octagon box and 4” square box] [European BESA or 1-gang]. The mounting base shall not contain any electronics, shall support all Microprocessor-based Smoke detector types detailed in this specification, and have the following minimum requirements:

1. Removal of the respective detector shall not affect electronic loop communications with other detectors on that loop.
2. Field Wiring Connections shall be made to the room side of the base, so that wiring connections can be made or disconnected by the Contractor without the need to remove the mounting base from the electrical box.
3. The base shall be capable of supporting remote alarm annunciation.

2.17 ANALYTICAL MICROPROCESSOR-BASED DETECTORS - DUCT SMOKE DETECTION APPLICATIONS:

A. The Analytical Microprocessor-based photoelectric smoke detectors shall be readily adaptable for use directly in air duct smoke detection applications, in ducts 3 ft (0.91m) high and 3 ft (0.91m) wide. When used for duct smoke detection, the smoke detectors shall not forfeit any of the system functionality which they have when used as area smoke detectors.

B. Duct detector housing: The Analytical Microprocessor-based photoelectronic and Multi-Sensor smoke detectors shall be readily adaptable for use in air duct smoke detection applications, using a housing that mounts to the outside of the duct. When used for duct smoke detection, the smoke detectors shall not forfeit any of the system functionality which they have when used as area smoke detectors.

C. The duct smoke detection housing shall allow the detector to sample and compensate for, variations in duct air velocity between 300 and 4000 feet per minute (300 to 1000 for ion-photo-heat detector).

D. Remote alarm LEDs and Remote Test Stations shall be supported by the duct smoke detector.

E. All detectors used in duct applications shall be located in accordance with NFPA 72E recommendations.

2.18 ANALYTICAL MICROPROCESSOR-BASED DETECTORS – REMOTE ALARM LED.

Provide where indicated on the plans or where the detector is not in sight from the ground, a Remote LED Alarm Indicator for each smoke detector. LED shall have a 180-degree viewing angle and mount on a standard 1-gang box.

2.19 SINGLE RISER SIGNAL MODULE:

The Microprocessor-based Addressable Single Input Signal Module shall provide one (1) supervised Class B (style Y) Indicating Appliance Circuit capable of a controlling 2A of polarized 24 VDC Notification Appliances, 50W speaker circuit power @ 25VRMS, or 35W speaker circuit power @ 70VRMS.

A. The Microprocessor-based Addressable Single Riser Signal Module shall provide one (1) supervised Style Y Indicating Appliance Circuit (IAC) for the connection of a telephone call-in circuit. The module shall have the capability of generating its own “ring tone” to ensure that the Fire Fighter knows that they are connected to the telephone call-in circuit.

2.20 CONTROL RELAY MODULE:

A. Microprocessor-based Addressable Control Relay Modules shall provide one form “C” dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or equipment processes. The control relay module shall be rated for pilot duty applications and releasing systems service. The position of the relay contact shall be confirmed by the system firmware. Non-addressable relays will not be allowed.

B. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

C. Secure Egress Door Controls: Provide an output signal using an addressable relay to unlock secured path of egress door devices upon system notification.

B. Elevator Recall:

1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:
   a. Elevator lobby detectors except the lobby detector on the designated floor.
   b. Smoke detector in elevator machine room.
   c. Smoke detectors in elevator hoistway.
2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
4. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

2.21 MICROPROCESSOR-BASED ADDRESSABLE MANUAL PULL STATIONS – GENERAL:

The Fire Alarm System shall incorporate microprocessor-based addressable Manual Pull Stations connected over a 2-wire electronic communications loop, using both broadcast and serial polling protocols. All Manual Pull Stations shall display communications and alarm status.

A. All addressing of the Microprocessor-based Addressable Manual Single Action Pull Stations shall be done electronically, and the electrical location of each station shall be automatically reported to the Fire Alarm Control Panel, where it may be downloaded into a PC, or printed out. The addressing of the Manual Pull Station shall not be dependent on their electrical location on the circuit.

B. All Microprocessor-based Addressable Manual Pull Stations shall have a visual means to confirm communications with the FACP, and a visual means to confirm the alarm status of the modules.

C. All field wiring to the Microprocessor-based Addressable Manual Pull Stations shall be supervised for opens and ground faults. All ground faults shall be location annunciated to the module of incidence.

D. Diagnostic circuitry, and their associated indicators, with reviewable Trouble Codes, shall be integral to the Microprocessor-based Addressable Manual Pull Stations to assist in troubleshooting system faults.

E. All Manual Fire Alarm station shall be suitable for operation in the following environment:

   1. Temperature: 32^{o}F to 120^{o}F (0^{o}C to 49^{o}C)
   2. Humidity: 0-93% RH, non-condensing
   3. Include ground fault to the device.

F. Each Manual Pull Station shall have a Stopper II Lexan cover.

2.22 MICROPROCESSOR-BASED ADDRESSABLE SINGLE ACTION FIRE ALARM STATION:

The Microprocessor-based Addressable Fire Alarm Stations shall be single action fire alarm stations. Provide a key locked test feature. Finish the station in red with white “PULL IN CASE OF FIRE” lettering.

2.23 FIRE ALARM NOTIFICATION APPLIANCES:

A. Fire alarm notification appliances – general requirements: All appliances which are supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the “Equivalent Facilitation” which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971, and ULC S526 Listed. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to ensure that the application of the appliances are done in accordance with the single manufacturers’ instructions. Any appliances that do not meet the above requirements, and are submitted for use must show written proof of their compatibility for the purposes intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended. All strobes shall be provided with lens markings oriented for wall mounting. It shall be possible to replace the lens of any installed strobe in order to facilitate the replacement of a broken lens, or to change the orientation of the lens markings. Ceiling mounted strobes shall have lens markings with correctly oriented lettering. Removal of an installed strobe to facilitate the changing of a lens shall not be acceptable.

B. Self - synchronized strobes: Strobes shall be supplied by the same manufacturer as the Fire Alarm Control Equipment. In - Out screw terminals shall be provided for wiring. The Strobes shall have a red or white plastic faceplate. They shall provide the proper candela output for the project and synchronized flash outputs. The strobe shall have lens markings oriented for wall mounting.

C. The same manufacturer as the Fire Alarm Control Equipment shall supply strobes. In - Out screw terminals shall be provided for wiring. The Strobes shall have a red metal faceplate. Provide candela ratings as shown on drawings. All strobes in multi-outlet areas shall be synchronized.

D. Speaker/strobes - electronic type: Horns shall by the same manufacturer as the Fire Alarm Control Equipment. In - Out screw terminals shall be provided for wiring. The Horn shall have a red plastic housing. Horns shall be suitable for indoor or outdoor use. A sound output level of 103 dBA Peak shall be provided. It must not be necessary to completely remove the screws to facilitate mounting.

E. Horn/strobes shall by the same manufacturer as the Fire Alarm Control Equipment. The Horn/Strobes shall have a red plastic housing. Provide candela ratings as shown on drawings. All strobes in multi-outlet areas shall be synchronized. Removal of a installed Horn/Strobe to change the lens markings shall not be acceptable. Horns shall provide a

100 dBA Peak sound output. It must not be necessary to completely remove the screws to facilitate mounting.

2.24 EXTERIOR HORNS shall be recessed mounted in a red metallic weatherproof cast aluminum box.

3 SYSTEM WIRING:

A. Raceways and outlet boxes: Shall comply with all other applicable Division 26 Specifications. Minimum raceway size for the fire alarm system shall be 1/2". The complete raceway system shall be grounded and bonded in accord with the requirements of the NEC. Outlet boxes shall be installed in the approximate locations indicated on the Drawings. It is the responsibility of the Contractor to ensure that the final locations of fire detectors and other initiating and indicating appliances and devices are in compliance with all applicable codes.

C. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.
2. Pathways shall be installed in EMT unless within plenum space where plenum rated cabling may be used.
3. Exposed EMT shall be painted red enamel.

C. Conductors and terminations: Shall be copper with type THHN/THWN insulation. Minimum conductor size shall be #14 AWG except that signaling line circuit (SLC) loops shall be wired with UL listed type FPL cable comprised of a jacketed and electrically shielded pair of conductors #18 AWG or larger. If stranded conductors are used they shall comply with Sections 760-16(c), 760-28(a), and 760-30(a) of the NEC.

D. All circuits shall be identified using a unique conductor insulation color throughout the system for each type of circuit.

E. Termination of conductors shall be by means of factory wiring terminals or factory pigtails.

2.25 CIRCUIT PROTECTORS:

Shall have a line-to-line response time of less than one nanosecond capable of accepting greater than 2000 amps at 28 volts. Line-to-earth response time shall be less than one nanosecond with a maximum current of 2000 amps (35 joules each line) to earth. Shield to earth current shall be 5000 amps maximum. Spark gap devices or devices incorporated in or installed within the fire alarm control panel in lieu of the specified protector are not acceptable.

2.26 NETWORKED FIRE ALARM SYSTEM:

A. Network fire alarm control units shall include all features as described in this specification for stand-alone FACUs and shall have network communication capabilities as described herein.
B. All points monitored and controlled by a single node shall be capable of being programmed as “Public”. Each point made public to the network may be programmed to be operated by any other node connected to the network.
C. Network communications shall be capable of supporting “point lists” that can be handled as though they were a single point.
D. The network shall provide a means to log into any node on the system via a laptop computer and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. [The means shall include the capability to log into any node on the system via TCP/IP Ethernet network communications protocol compatible with IEEE Standard 802.3. Ethernet access to any fire alarm panel shall be capable of providing access only to authenticated users through a cryptographically authenticated and secure SSL tunnel. Provisions for a standard RJ-45 Ethernet connection to the owner’s Ethernet network must be provided at each node as part of the contract. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
E. Network node communication shall be through a token ring, hub, or star topology configuration, or combination thereof.
F. A single open, ground or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.
G. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
H. Fiber optics communication shall be provided as an option via a fiber optics modem. Modem shall multiplex audio signals and digital communication via full duplex transmission over a single fiber optic cable, either single mode or multi mode.
I. The communication method shall be NFPA 72 style 7.”

PART 3 - EXECUTION

3.1 The entire system shall be installed in a workmanlike manner in accordance with approved manufacturers manuals and wiring diagrams. The Contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the NEC, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

3.2 All penetration of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes. In addition, all walls shall be water-proofed at conduit penetrations.

3.3 END OF LINE RESISTORS:

Shall be furnished as required for mounting as directed by the manufacturer.

3.4 INSTALLATION OF CONTROL PANEL AND RELATED EQUIPMENT:

A. Installation of all Fire Alarm Control Equipment and Field Mounted Devices and Appliances shall be in strict compliance with the manufacturer's written instructions.

B. Connection of the fire alarm system power supply (supplies) to the electrical system shall be by a dedicated branch electrical circuit. The means to disconnect this circuit shall be accessible only to authorized personnel, shall be capable of being locked in the "on" position, and shall be clearly marked "FIRE ALARM CIRCUIT CONTROL" in accord with NFPA standards.

C. Batteries shall only be installed in the control panel enclosure when they are of the gelled-electrolyte type and where the control panel manufacturer recommends such installation.

D. The Control Equipment shall not be installed until all field wiring to the field mounted devices and appliances have been installed and the wiring on those circuits have been checked for faults and shorts, and any faults and shorts found have been corrected.

E. The Fire Alarm Contractor shall neatly lace all field wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except homeruns from fire alarm system circuits and system power supply circuits shall be permitted in the control panel enclosure. Additionally, no wiring splices will be permitted in the control panel enclosure.

3.5 SYSTEM WIRING AND SUPERVISION:

A. Provide a Style 7 initiating and alarm circuits with electrical supervision for shorts and open conditions.

B. Install end-of-line resistors as required.

C. Power Supplies: The control panel shall receive 120 VAC power via the existing power supply for the current fire alarm control panel, unless otherwise shown.

D. All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.

E. Control of auxiliary services:

1. Fan shut down relays. Only addressable control relays will be allowed.
2. Alarm initiation from kitchen extinguishing equipment.

F. Equip and wire system so that by energizing fire alarm audible signaling devices will also activate the following:

1. Interior strobe lights.
2. Fan shut-down circuits.
3. Release kitchen fire rated shutter after a 15 second time delay. Time delay shall be adjustable from 0 to 60 seconds.
4. Closing of the main gas service valve.

3.6 SYSTEM TEST AND CERTIFICATION / DEMONSTRATION:

The completely installed fire alarm system will be fully tested in compliance with Testing Procedures for Signaling Systems (ANSI/NFPA 72H). The Fire Alarm Contractor shall test:

A. Every alarm initiating appliance and device for proper response and program execution.

B. Every indicating appliance for proper operation and audible/visual output

C. All auxiliary control functions such as elevator capture, smoke door and damper release, and functional override of HVAC, ventilation, and pressurization controls.

3.7 The Architect shall be notified at least 10 working days prior to the scheduled testing so that he/she may be present for such testing. The testing will only be scheduled after “As-Built” Drawings are turned in with the Affidavit of True and Correct As-Built Drawings fully executed. Find blank affidavit at the end of this section.

A. After the system has been completely tested to the satisfaction of the Architect, and the building Owner; the Fire Alarm Contractor shall complete the Fire Alarm System Certification of Completion form published by the NFPA (Figure 1-7.2.1 in the National Fire Alarm Code). In compliance with published NFPA standards, parts 1, 2, and 4 through 10 shall be completed after the system is installed and the wiring has been checked. Part 3 shall be completed after the operational acceptance tests have been completed. The completed form signed by the qualifying agent of the Fire Alarm System Contractor shall be delivered to the Architect with the other system documentation required by these specifications.

3.8 DELIVERY OF SYSTEM DOCUMENTATION PACKAGE:

The Fire Alarm Contractor shall deliver two sets of the System Documentation Package to the Building Owners Representative and the Local Authority Having Jurisdiction. Final payment of the Contractor will not be authorized until the complete documentation specified herein is delivered to the Architect. The System Documentation Package shall consist of the following documents, to be provided after the fire alarm system has been completely installed and tested:

A. Operations and Maintenance Manuals which detail the operation and maintenance of the installed System. An “As-Built” copy of the scaled plan of each building showing the actual installed location of each piece of fire alarm equipment as well as the installed raceway sizes and routing, conductor sizes and quantities in each raceway, and the exact location of each junction box. The Affidavit of True and Correct As-Built Drawings shall be fully executed and turned in with “As-Built” drawings (as shown at the end of this section).

B. Point to Point diagrams of the entire System as installed and tested. Point to Point Diagrams shall include all connected Smoke and Heat Detectors and addressable Field Mod

ules. In addition, “As-Built” riser and wiring diagrams reflecting all T-Taps, each programmed device characteristic including detector type, base type, serial number, sensitivity setting and wire configurations will be provided to the Architect, based on the information gathered during the system final testing process.

C. All “As-Built” drawings and diagrams shall be done and turned over to the Owner.

D. The application program (database) listing for the system as installed at the time of acceptance by the building Owner and/or Local AHJ (Disk and Hard copy printout).

E. Time and Date stamped report, which lists every Fire Alarm System Cabinet within the system. This report shall include date regarding each cabinet in the system, the hardware modules mounted in each cabinet, and the physical mounting location of each module.

F. A Time and Date stamped report, which lists every detector, module, switch and output circuit within the system. This report shall include addressing, custom labeling, device type, and physical location for each device.

G. A letter certifying that the installation is in strict compliance with all applicable codes and in strict compliance with the requirements of these specifications.

H. Two originals of the NFPA document titled “Fire Alarm System Certification and Description” completely filled-in and signed as required.

I. Name, address, and telephone of the authorized factory representative.

J. Written certification by the fire alarm Contractor that no power supply audio amplifier or circuit on the system has an electrical load greater than 80% of its rated capacity.

K. Copies of the manufacturers’ 3-year warranty on all the system components and the Contractors’ 3-year warranty on the installed system.

3.9 SYSTEM STARTUP:

A Factory Trained and Authorized Engineered Systems Distributor shall perform system Startup. A Contractor under the direction of the Factory Trained and Authorized Engineered Systems Distributor may perform certain functions of the Systems Startup Procedure.

3.10 INSTRUCTION OF OWNER:

The Fire Alarm Contractor shall schedule and execute an instruction class for the Building Owner, which details the proper operation of the installed fire alarm system. The instruction shall also cover the schedule of maintenance required by NFPA 72H and any additional maintenance recommended by the system manufacturer. This instruction shall also be separately furnished to the Local Municipal Fire Department if so requested by the Local Authority Having Jurisdiction. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation. The Fire Alarm Contractor shall provide operations manuals or any other curricula that may enhance the instruction of the Building Owners or Local Municipal Fire Department in the operation and maintenance of the system.

3.11 WIRING:

A. All wiring shall be installed according to NEC standards per the drawings submitted by the authorized Engineered Systems Distributor, unless otherwise noted.

B. Where required, wiring shall be in metallic conduit solely for the fire detection and alarm system. Minimum conductor size shall be #14 AWG. Install and connect wiring in conformance with the recommendations and wiring diagrams provided by the Fire Alarm System manufacturer. Adhere to the zones indicated on the Drawings. Any non-metallic conduit shall be replaced with metallic conduit with no cost to the Owner.

C. All wiring shall be tagged, numbered, color-coded and terminated on terminal blocks in the cabinets, in boxes, at equipment and at devices. Wire nuts or splices shall not be used. Each set of zone conductors shall be tagged with the zone number on each conductor at termination (each end) and in each junction or pull box in the raceway system.

3.12 Mounting of fire alarm boxes shall be 48" above finished floor (Handicapped Code).

3.13 Junction boxes and cabinets for the Fire Alarm System shall be painted International "FIRE RED".

3.14 FIELD QUALITY CONTROL:

The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.15 Provide in a frame and under glass, computer generated, color-coded diagram of the building and site, indicating the zones by number. Install frame near the fire alarm control panel or the annunciator panel or at a location designated by the Owner's representative. Minimum size of the graphic shall be 11"x17".

3.16 TESTS:

Upon completion of the installation, the Contractor and the manufacturer's authorized representative together shall test every alarm initiating device for proper response and zone indication, every alarm signaling device for effectiveness, and all auxiliary functions. Repeat all tests with "NORMAL" power disconnected. The Owner and designated representative shall be given the opportunity to witness these tests. An itemized test report shall be submitted to the Owner, detailing and certifying all results.

3.17 WARRANTIES:

The Contractor shall warrant the complete fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of 3 years specified herein

from the date of placing the completed system in operation. The conductors shall be replaced on any loop that exhibits repeated ground faults. If the ground faults persist, each device on that loop shall be replaced. These repairs are to be considered warranty work and shall be performed at no additional cost to the Owner.

3.18 The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of 2 inspections and tests per year in compliance with NFPA-72 guidelines.

3.19 The maintenance contract shall include an agreement by the manufacturer that it will provide to the Owner, verifiable evidence to substantiate its claim that damage to any part of the fire alarm system was caused by lightning. Such evidence shall include, but not limited to, proof that the surge entered the equipment either on power conductors, system ground or by communication lines. Proof that the surge was not related to switching, welding, motor starting, copy machines or equipment with silicon-controlled rectifiers such as battery chargers and un-interruptible power systems.

3.20 Furnish 3 bound copies of brochure including maintenance instructions, spare parts list, wiring diagram and troubleshooting check list.

END OF SECTION 28 46 21.11

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SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade walks pavements turf and grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks and pavements.
6. Subbase course and base course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.3 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct pre-excavation conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Material test reports.

1.5 FIELD CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations..

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than **3 inches** in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: **12 inches** each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells,

joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 6-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

E. Initial Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content and per geotechnical engineer's written recommendations.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS.

A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.
2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight per ASTM D 1557.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

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SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes construction dewatering.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 FIELD CONDITIONS

A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide temporary grading to facilitate dewatering and control of surface water.

B. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 015000 "Temporary Facilities and Controls," during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.

C. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

C. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.4 FIELD QUALITY CONTROL

A. Survey-Work Benchmarks: Resurvey benchmarks regularly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

END OF SECTION 31 23 19

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the EPA-Registered Label for termiticide products.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Soil Treatment Application Report: Include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

C. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

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 requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Three (3) years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an Registered termiticide, complying with requirements of authorities having jurisdiction, including the FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES in compliance with Florida Statues, Chapter 487, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

1. Products: As listed on the Florida Department of Agriculture and Consumer Services website. http://www.flaes.org/pdf/termiticidesregisteredinflorida.pdf
2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than three (3) years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.2 APPLYING SOIL TREATMENT

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

C. 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 in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

D. 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 treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Underground-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 the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

E. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

F. 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.

G. Post warning signs in areas of application.

H. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

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 temporary excavation support and protection systems.

B. Related Requirements:

1. Section 01 32 33 "Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
2. Section 31 20 00 "Earth Moving" for excavating and backfilling, for controlling surface-water runoff and ponding, and for dewatering excavations.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review geotechnical report.
2. Review existing utilities and subsurface conditions.
3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
4. Review proposed excavations.
5. Review proposed equipment.
6. Review monitoring of excavation support and protection system.
7. Review coordination with waterproofing.
8. Review abandonment or removal of excavation support and protection system.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, performance properties, and dimensions of individual components and profiles, and calculations for excavation support and protection system.

B. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified professional engineer.

1. Include plans, elevations, sections, and details.

2. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design.
3. Indicate type and location of waterproofing.
4. Include a written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation.

C. Delegated-Design Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Land surveyor.
2. Professional Engineer: Experience with providing delegated-design engineering services of the type indicated, including documentation that engineer is licensed in the state in which Project is located.

B. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

A. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.7 FIELD CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility-serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Architect and owner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Architect's written permission.

B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations

at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:

1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
3. Compliance with requirements of authorities having jurisdiction.
4. Compliance with utility company requirements.
5. Compliance with railroad requirements.

2.2 MATERIALS

A. Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A36/A36M, ASTM A690/A690M, or ASTM A992/A992M.

C. Steel Sheet Piling: ASTM A328/A328M, ASTM A572/A572M, or ASTM A690/A690M; with continuous interlocks.

1. Corners: Site-fabricated mechanical interlock.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of size and strength required for application.

E. Shotcrete: Comply with Section 033713 "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.

F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

G. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

H. Tiebacks: Steel bars, ASTM A722/A722M.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

3.2 INSTALLATION - GENERAL

A. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

3.3 SOLDIER PILES AND LAGGING

A. Install steel soldier piles before starting excavation.

1. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement.
2. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging.
3. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier piles as excavation proceeds.

1. Trim excavation as required to install lagging.
2. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

3.4 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.

B. Accurately place the piling using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer.

1. Limit vertical offset of adjacent sheet piling to 60 inches.
2. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

C. Cut tops of sheet piling to uniform elevation at top of excavation.

3.5 TIEBACKS

A. Drill, install, grout, and tension tiebacks.

B. Test load-carrying capacity of each tieback, and replace and retest deficient tiebacks.

1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.

C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
2. Install internal bracing if required to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.7 MAINTENANCE

A. Monitor and maintain excavation support and protection system.

B. Prevent surface water from entering excavations by grading, dikes, or other means.

C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.8 FIELD QUALITY CONTROL

A. Survey-Work Benchmarks: Resurvey benchmarks monthly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.

1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.
2. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.9 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.

1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
2. Remove excavation support and protection systems to a minimum depth of 60 inches below overlying construction, and abandon remainder.
3. Fill voids immediately with approved backfill compacted to density specified in Section 312000 "Earth Moving."
4. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION 31 50 00

END OF SECTION 31 31 16