

PROJECT MANUAL

for

CITY OF WARREN NEW FIRE STATION #1 and #5 ITB-W-0912

James R. Fouts, Mayor

One City Square
Warren, MI 48093-5289



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**PARTNERS PROJECT # 21-146A/B
JUNE 13, 2023 / BIDDING – CONSTRUCTION**

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PROJECT IDENTIFICATION

PROJECT: **CITY OF WARREN – FIRE STATION NO. 1**
23345 Van Dyke Avenue
Warren, MI 48089

CITY OF WARREN – FIRE STATION NO. 5
30619 Schoenherr Road
Warren, MI 48088

ITB-W-0912

OWNER: CITY OF WARREN
One City Square
Warren, MI 48093

ARCHITECT: PARTNERS IN ARCHITECTURE, PLC
65 Market Street
Mount Clemens, MI 48043
(586) 469.3600

PARTNERS PROJECT NUMBER: 21-146A/B

BID DUE DATE: **July 19, 2023 @ 12:30 PM**

BID LOCATION: Division of Purchasing
CITY OF WARREN
One City Square; 4TH Floor
Warren, MI 48093-5289

END OF SECTION



AIA® Document A701® – 2018

Instructions to Bidders

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

Warren New Fire Station #1 and #5 PIA #21-146A/B

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

City of Warren
One City Square, 4th Floor
Warren, MI 48093-5289

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

PARTNERS in Architecture, PLC
65 Market Street
Mount Clemens, MI 48043
Telephone Number: 586-469-3600

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- 8 **ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS**

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.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 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 decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves 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 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 four 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. Paper bid forms shall be executed in a non-erasable medium.

§ 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 on paper bid forms 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 Each copy of 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. Each copy of 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.)

§ 4.2.2 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 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.)

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 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.

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

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

§ 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.)

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 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 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 bonds to the Owner not later than three 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 or after 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

.6	Specifications			
	Section	Title	Date	Pages
.7	Addenda:			
	Number	Date	Pages	
.8	Other Exhibits: <i>(Check all boxes that apply and include appropriate information identifying the exhibit where required.)</i>			
	<input type="checkbox"/> AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below: <i>(Insert the date of the E204-2017.)</i>			
	<input type="checkbox"/> The Sustainability Plan:			
	Title	Date	Pages	
	<input type="checkbox"/> Supplementary and other Conditions of the Contract:			
	Document	Title	Date	Pages
.9	Other documents listed below: <i>(List here any additional documents that are intended to form part of the Proposed Contract Documents.)</i>			

ADVERTISEMENT FOR BIDS

City of Warren NEW FIRE STATION NO. 1 and NEW FIRE STATION NO. 5 ITB-W-0912

The City of Warren will receive single prime electronic bids for the CITY OF WARREN – NEW FIRE STATION NO. 1 and NEW FIRE STATION NO. 5 projects.

ELECTRONIC BIDS ARE DUE: ON OR BEFORE 12:30pm, WEDNESDAY, JULY 19, 2023

THE CITY WILL ONLY ACCEPT ELECTRONIC BIDS SUBMITTED VIA THE BIDNET (MITN) SYSTEM.

Bids shall be submitted electronically through the MITN site. Bids received after 12:30pm of the date they are due will not be accepted. Bids received will be publicly opened via virtual meeting (ZOOM) and read aloud at 1:00pm.

If the contractor has any questions regarding the steps needed to complete the electronic bid submission, they shall contact the BidNet (MITN) help desk at 1-800-835-4603 and select option 2 when prompted.

LINK TO ZOOM MEETING:

<https://cityofwarren.zoom.us/j/85346942010?pwd=R04xZnB5dFA2VTFkZcxU0s3czRqQT09>

ZOOM CALL-IN #: 1 301 715 8592

ZOOM MEETING ID: 853 4694 2010

ZOOM MEETING PASSCODE: 224403

There will be a Pre-Bid Meeting, for all contractors wishing to submit a bid on **June 21, 2023, at 10:00am**. Pre-Bid Meeting will be held in the community room of the Maybelle Burnette Library located at 23345 Van Dyke Avenue, Warren, MI 48089. All contractors are encouraged to attend.

This project includes:

FIRE STATION NO. 1

A new single story, 3-bay Fire Station (Approximately 12,700 SF Gross Area) with (3) drive-through apparatus bays, fire fighter dorms, living and support spaces, a separate storage garage and associated site development on a site located north of Continental and south of Republic Avenues on the west side of Van Dyke Avenue, Warren Michigan upon property with a current street address of 23211 Van Dyke Avenue, Warren, Michigan. This property is adjacent to the Warren Civic Center South.

The project also includes the demolition and complete removal of the existing ReStore Building currently located on the corner of this site.

FIRE STATION NO. 5

A new single story, 3-bay Fire Station (Approximately 12,700 SF Gross Area) with (3) drive-through apparatus bays, fire fighter dorms, living and support spaces, and associated site development on a site located on the west side of Schoenherr Road, Warren Michigan upon property with a current street address of 30619 Schoenherr Road, Warren, Michigan.

The project also includes the demolition and complete removal of the (2) existing residential structures currently located on this site.

Make proposals on the bid form supplied in the project manual. Submit with each bid an acceptable bid bond payable to City of Warren, in an amount equal to five percent (5%) of the total bid.

Bids may not be withdrawn for a period of ninety (90) days after the scheduled time of opening bids, without the consent of the Owner. The City reserves the right to reject any or all bids received and to waive any formalities in regard thereto. In addition, the City reserves the right to evaluate bids on any basis determined by the City to be in the best interest of the City and to consider alternate bids if the low bidder(s) does not comply with the project requirements or are otherwise determined to be unqualified.

Bid documents will be available to prospective bidders on or around June 13, 2023. Bid documents can be electronically downloaded from the Michigan Inter-Governmental Trade Network (MITN) website @ www.mitn.info.

Questions should be directed to PARTNERS in Architecture, PLC, preferably in writing and via email. Forward questions to: jhoulihan@partnersinarch.com. Last day for questions is July 7, 2023 at 5:00pm.

PARTNERS in Architecture, PLC
65 Market Street
Mount Clemens, MI 48043
(586) 469-3600

GENERAL CONDITIONS (Effective November 15, 2022)

SIGNATURE

Bids and all information requested of the vendor shall be entered in the appropriate space on the bid form and Signature Page. Failure to do so may disqualify your offer.

An authorized officer or employee of the vendor shall sign all bids.

ELECTRONIC BID SUBMISSION

Electronic bids shall be submitted via the BidNet (MITN) system by the date specified and at or prior to the time specified to be considered. Late bids, e-mail, telegraphic, sealed, or telephone bids will NOT be accepted.

Bids received after 12:30 pm of the date they are due will not be accepted.

RELATIONSHIP DISCLOSURE

It is required that any relationship (business or personal) to a City employee or official be disclosed. This includes employment or other professional engagements.

ALTERATION OF BID DOCUMENTS

Vendor **changes or alterations to the bid documents, including the specification, may result in the bid being considered non-responsive** and/or the Bidder being debarred. The only authorized vendor changes to the bid documents will be in the areas provided for the Bidder's response including the "Exceptions" section of the bid and on separate attached sheets submitted by the vendor. Vendor shall clearly identify product offered and deviations from the specification. If a change or alteration to the bid document is undetected, and the bid is awarded the contract, the original terms, conditions, and specification in the authorized version of the bid document will be applicable during the terms of the contract. Bidders are responsible for ensuring they have obtained all relevant documents including amendments, clarifications, changes, drawings, etc. as made available by the City.

PRICES

Prices quoted shall be for new products in current production unless otherwise specified. Where refurbished or discontinued items are offered they shall be clearly identified as such.

Prices quoted shall be exclusive of any rebates due the City. Any rebates the City may be entitled to should be shown as a separate line item and include expiration date.

Corrections and/or modifications received after the bid closing time specified will not be accepted.

Unit prices prevail.

All information shall be entered in ink or typewritten. Mistakes may be crossed out and corrections inserted before submission of your bid. The person signing the bid shall initial corrections in ink.

All prices will be proposed F.O.B. DESTINATION, INCLUDE ALL DELIVERY AND ANY ADDITIONAL CHARGES and remain in effect as specified in the bid.

AWARD

Unless otherwise stated in the bid documents, the City cannot guarantee exclusivity of the contract for the proposed products or services.

Award of the bids shall be based upon a combination of factors, including but not limited to, adherence to bid requirements, references and any other factors that may be in the City's best interest.

The City reserves the right to reject any and all bids, and to waive any defect or irregularity in bids. The City reserves the right to accept and separate items in the bid and to accept the bid that, in the opinion of the City, is to the best advantage and interest of the public we serve. The City also has the right to re-solicit bids if it is deemed to be in the best interest of the City .

The City reserves the right to reject low bids which have major deviations from our specifications; to accept a higher bid which has only minor deviations. By signing the bid, Bidders agree to accept a split award unless the Bidder clearly indicates that it takes Exception. The bid will be awarded to that responsible, responsive firm whose bid, conforms to this solicitation and will be most advantageous to the City, with regard not only to price but also to availability of product, location and quality of product considered.

The City reserves the right to award all line items, to make no award or to award on an individual line item basis, whichever is deemed to be in the best interest of the City.

Time of delivery may be a consideration in the award.

The City reserves the right to consider as unqualified to perform the contract any bidder who does not habitually perform with its own forces seventy-five (75%) of the work involved.

TERMINATION

1. Failure to Perform. The City may terminate a bid award for the failure to perform a term of the bid specifications to the satisfaction of the City. The City shall provide ten (10) days advance written notice to the Awarded Vendor for the failure to perform services or for the violation of any other term of the bid specifications. Unless futile or the violation is recurring, the City shall provide notice and the opportunity to cure the violation prior to termination. Such notice to cure shall be given in writing by first-class mail. In the event of a dispute, or in order to avoid interruption of service, the City may engage another to perform the work and the Awarded Vendor shall be responsible for any costs the City incurs as a result of the Awarded Vendor's violation. The City may withhold payment to offset any damages the City incurs as a result of the Awarded Vendor's violation.

2. At Will. A bid award may be terminated at will by the City upon a minimum of thirty (30) days prior written notice to the Awarded Vendor. In the event of termination as provided in this subsection, the Awarded Vendor will be compensated for all services performed and approvable reimbursable expenses from the inception date to the termination date provided the services performed and the expenses were provided in accordance with the bid specifications. Payment shall be made upon the Awarded Vendor delivering to the City all information and materials retained by the Awarded Vendor, affiliates, or subcontractors in performing the services described in the bid specifications, whether completed or in progress.

3. MISREPRESENTATION. In addition, the City may reject this Bid, or cancel a contract with an Awarded Vendor, if there is evidence of any misleading or intentionally fraudulent information or documents provided in connection with this Bid.

SPECIFICATION

Brand names and numbers, when used, are for reference to indicate the character or quality desired, unless specifically stated "No Substitutes".

Alternate items of the same quality will be considered, provided your offer clearly describes the article. Offers for alternate items shall state the brand and number, or level or quality. When the bidder does not state brand, or level of quality, it is understood the offer is exactly as specified.

All products and services shall be in accordance with all applicable federal, state and local statutes, rules, ordinances, etc.

All personnel shall have the appropriate licenses with endorsements for the work performed.

In addition, any personnel driving a vehicle on City property shall have the appropriate valid driver's license and have or exceed minimum statutory insurance requirements.

E-VERIFY

Any bidder, attesting to his bid by signature, is affirming that the Bidder has registered with, participates in and utilizes the E-Verify Program (or any successor program implemented by federal Department of Homeland Security and Social Security Administration) to verify the work status of all newly hired employees employed by the Bidder.

NON-IRAN LINKED BUSINESSES

By signing below, Bidder certifies and agrees on behalf of Bidder and the company submitting this bid the following: (1) that the Bidder is duly authorized to legally bind the company submitting this bid; (2) that the company submitting this bid is not an "Iran linked business," as defined in Section 2(e) of the Iran Economic Sanctions Act, being Michigan Public Act No. 517 of 2012; and (3) that Bidder and the company submitting this bid will immediately comply with any further certifications or information submissions requested by the City in this regard.

ASSIGNMENT OF AGREEMENT – OTHER CONTRACTORS.

The Awarded Vendor shall not assign the contract or any part thereof without the written consent of the City.

PERIOD AGREEMENTS

No Exclusive Contract/Additional Services. The Awarded Vendor agrees and understands that the contract shall not be construed as an exclusive agreement and that the City may, at any time, secure similar or identical services at its sole option.

Any contract executed pursuant to this Bid, which is for a specific term shall include for an extension of the contract term, at the option of the City, as follows:

The City shall have the sole option to extend the contract herein for a period of two months by written notice to the Awarded Vendor exercising the option served at least ten days prior to the expiration date of the contract. In the event such option is exercised by City, all of the provisions of the contract shall remain in full force and effect other than the date of expiration of the contract.

The quantities have been estimated for bid award purposes and may be estimated based on past usage. The quantities may increase or decrease and the City makes no representation as to guarantee of usage. The quantities are estimated on an annual basis.

PAYMENT TERMS

The City's normal payment terms are 45 days in connection with cash discounts specified with this bid. Time will be computed from the date of complete delivery of services, supplies, or equipment, as specified, or from the date correct invoices are received in the Office of the City

Controller, if the latter is later than the date of delivery. Prices will be considered as net if no cash discount is shown.

Progress payments will be made on the basis of hours of work completed during the course of the engagement in accordance with the firm's fee bid. Interim billings shall cover a period of not less than a calendar month.

MICHIGAN FREEDOM OF INFORMATION ACT (FOIA)

All costs incurred in the preparation and presentation of this bid, in any way whatsoever, shall be wholly absorbed by the Bidder. All supporting documentation shall become the property of the City unless requested otherwise at the time of submission. Michigan FOIA requires the disclosure, upon request, of all public records that are not exempt from disclosure under Section 13 of the Act, which are subject to disclosure under the Act. Therefore, confidentiality of information submitted in response to this RFP is not assured.

EQUAL OPPORTUNITY CLAUSE

This contract requires adherence to the equal opportunity clause, 41 CFR § 60-1.4.

EXCEPTIONS TO THE BID SOLICITATION

Each individual/group shall provide a list of Exceptions taken to this bid. Any Exceptions taken shall be identified and explained in writing. An Exception is defined as the individual/group's inability to meet a mandatory requirement or exceed a requirement in the manner specified in the bid solicitation. If the Bidder provides an alternative solution when taking an Exception to a requirement, the benefits of this alternative solution shall be explained. The City reserves the right to accept or reject any Exception whichever is deemed to be in the best interest of the City.

WITHDRAWAL OF BID

Bidders may withdraw their bids by submitting a written request over the signature of an authorized individual to the Purchasing Department any time prior to the submission deadline. Bidders may thereafter submit a new bid prior to the deadline. Modification or withdrawal of the bid in any manner, oral or written, will not be considered if submitted after the deadline.

SAMPLES

Sample of articles, when required, shall be furnished free of any cost to the City of Warren. Samples of articles selected may be retained for future comparison. Samples which are not destroyed by testing, or which are not retained for future comparison will be returned upon request at the vendor's expense. Unclaimed samples may be destroyed after one (1) year.

TAXES

If vendor **supplies tangible products only** to the City of Warren, **sales taxes** should not be included in your bid as the City of Warren is sales tax exempt.

DEFAULT TO CITY

It is understood that any Bidder who is in default to the City at the time of opening its bid shall have its bid declared null and void.

BIDDER DISCLOSURE

The Bidder declares that it has not, nor will it, provide gifts, gift certificates, entertainment, favors, or other gratuities to a City official, employee, agent, or volunteer, or to their families.

The Bidder acknowledges that if it violates this policy then the City may terminate the contract with the Bidder.

INDEMNITY CLAUSE

To the fullest extent permitted by law, the Bidder expressly agrees to indemnify and hold City and its Affiliates harmless against all losses and liabilities arising out of or related to bodily injury or property damages based upon any act or omission, negligent or otherwise, of Bidder or anyone acting on Bidder's behalf in connection with or incident to the work to be performed hereunder, except that Bidder shall not be responsible to indemnify the City for losses or damages caused by or resulting from the City's sole negligence.

For the purposes of this indemnity clause, "City" shall mean the City, its Affiliates, and their elected and appointed officials, employees, authorities, boards and commissions and volunteers working on behalf of the City and its Affiliates; "losses and liabilities" shall mean loss, cost, expense, damage, liability or claims, whether groundless or not; "breach, misappropriation or unauthorized use of data" shall mean copyright, patent, trademark or other intellectual property infringement or unauthorized use of license, software, programs, product, manuals or instructions; "personal injury" shall mean false arrest, erroneous service of civil papers, false imprisonment, malicious prosecution, assault and battery, libel, slander, defamation of character, discrimination, mental anguish, wrongful entry or eviction, violation of property or deprivation of rights, privileges or immunities secured by the constitution and laws of the United States of America or the State of Michigan, for which Vendor may be held liable to the injured party in any action at law, suit in equity or other proceedings for redress; "bodily injury: shall mean bodily injury, sickness or disease (including death resulting at any time there from) mental anguish and mental injury which may be sustained or claimed by any person or persons; and "property damage" shall mean the damage or destruction of any property, including the loss of use thereof.

The Bidder's obligation to indemnify and hold the City and its Affiliates harmless shall include, but not be limited to (1) the obligation to defend the City and its Affiliates from any such suit, action or proceeding, and (2) the obligation to pay any and all judgments which may be recovered in any such suit, action or proceeding, and/or any and all expenses, including but not limited to costs, attorney fees and settlement expenses which may be incurred.

APPENDIX A OF TITLE VI PLAN

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 shall comply with Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

2. NONDISCRIMINATION. The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, sex, or national origin in the selection, retention, and treatment of subcontractors, including procurements of materials in the discrimination prohibited by Section 21.5 of the Regulation, including employment practices when the contractor covers a program set for in Appendix B of the Regulations.

3. SOLICITATION 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 shall be notified by the contractor of the contractor's obligations under the contract and the Regulations relative to nondiscrimination on the grounds of race, color, sex, or national origin.

4. INFORMATION AND REPORTS. The contractor shall provide all information and reports required by the Regulations, or directives issues pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the State Highway Department or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the State Highway Department or the Federal Highway Administration, as appropriate, and shall set forth what efforts it has made to obtain the information.

5. SANCTIONS FOR NONCOMPLIANCE. In the event the contractor's noncompliance with the nondiscrimination provisions of this contract, the State Highway Department shall impose such contract sanctions as it or the Federal Highway 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. Cancellation, termination or suspension of the contract, in whole or in part.

6. INCORPORATION OF PROVISIONS. The contractor shall include provisions of paragraphs (1) through (6) in every subcontract, including procurement of material and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the State Highway Department or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the State Highway Department to enter into such litigation to protect the interests of the State, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

SAFETY DATA SHEETS

IMPORTANT: All City purchases require **SAFETY DATA SHEETS** where applicable, in compliance with the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard.

THE ABOVE GENERAL CONDITIONS ARE CONSIDERED IN FORCE UNLESS SPECIFICALLY ADDRESSED IN ANOTHER SECTION OF THE BID DOCUMENT

LABOR HARMONY ORDINANCE

Sec. 2-334.1. Labor harmony through prevailing wage and benefits for city projects.

(a) *Definitions:*

City project means new construction, alteration, repair, installation, painting, decorating, completing, demolition, conditioning, reconditioning, or improvement of public roads, land either owned by the city or under the direction and control of the city, public buildings or public facilities authorized by a contracting agent, the cost of which is clearly anticipated to be in excess of fifty thousand dollars (\$50,000.00). "City project" shall not include work done pursuant to any collective bargaining agreement between the city and its employees.

Construction mechanic means a skilled or unskilled mechanic, laborer, worker, helper, assistant, apprentice, journeyman or other professional designation working on a city project, but shall not include executive, administrative, professional, office or custodial employees.

Contracting agent means any officer, board, commission or authority of the city authorized to enter into a contract for a city project, or to perform a city project by the direct employment of labor.

(b) *Requirements:*

(1) Every contract for a city project which is executed between a contracting agent and a successful bidder or an approved responder to a request for proposal for a city project, entered into pursuant to a request for proposal advertisement and/or an invitation to bid for that city project, which requires or involves the employment of construction mechanics, and which is owned, controlled or financed, in whole or in part, by the city, shall contain an express term that the rates of wages and benefits to be paid to each class of mechanics by the bidder and all of his or her subcontractors shall be not less than the wage and benefits rate prevailing on similar projects in the city. The city's department of public service shall determine the prevailing wage at the rate established by the most recent survey of the Michigan Department of Consumer and Industry Services for prevailing wage determination under Act 166 of the Public Acts of 1965, as amended.

(2) A schedule of the prevailing wage and benefits for the classes of construction mechanics called for in a contract shall be made a part of the specifications for the work to be performed on a city project and shall be printed in the contract forms where work is to be done by contract.

(3) Every contractor and subcontractor on a city project shall keep posted in a conspicuous place on the construction site a copy of all prevailing wage and fringe benefit rates prescribed by the contract and shall keep accurate records showing the name, occupation, and actual wages and benefits paid to each construction mechanic employed by him or her in connection with said contract. This record shall be made available on demand for inspection by the contracting agent or the city.

(4) Contract specifications may include, when appropriate, a requirement that the successful bidder shall enter into a project labor agreement with the Greater Detroit Building and Construction Trades Council, AFL-CIO, and its affiliated unions for the development and construction of the project.

(5) The contracting agent, by written notice to the contractor and the sureties of the contractor known to the contracting agent, shall terminate the contractor's right to

proceed with that part of the contract and city project for which less than the prevailing rates of wages and benefits have been paid or will be paid, and may proceed to complete the contract by separate agreement with another contractor. The contracting agent shall withhold payment for work done until liabilities for unpaid wages and excess costs to the city for reletting the work have been met.

(6) In addition to any penalty provisions provided for in this section, any contractor found to be in violation of this section by any contracting agent shall be prohibited for two (2) years from bidding on any city project, regardless of the anticipated cost of the contract to be bid.

(c) *Exemption.* The requirements set forth in this section will not apply to a project or contract of the City of Warren, or any of its authorities, agencies or departments, including those authorities, agencies and departments created by the City of Warren under statutes of the State of Michigan, if that project or contract is subject to an exemption from labor standards or prevailing wage requirements under federal or state laws or regulations.

(d) *Retroactivity.* The provisions of this section shall not apply to contracts entered into or the bids made before the effective date of this section, or the effective date of an amendment to this section.

(Ord. No. 80-519, § 1, 9-23-97; Ord. No. 80-684, § 1, 3-9-10)

Editor's note: Ord. No. 80-519, § 1, adopted Sept. 23, 1997 amended ch. 2 by the addition of a new section 2-334.2, which provisions have been redesignated at the editor's discretion as section 2-334.1.

MATERIAL FINISH / COLOR SCHEDULE

PARTNERS 21-146
MATERIAL SCHEDULE
000200-1

Spec Section	Item	Description	Product Specified	Finish / Color
042000	UNIT MASONRY			
	FB-1	Face Brick	Belden Brick Company, Modular	Color: Commodore Clear Velour
	FB-2	Face Brick	Belden Brick Company, Modular	Color: Rum Raisin Velour
	GFM-1	Burnished Block	Grand Blanc Cement Products	Color: Forensic
	GFM-2	Burnished Block	Grand Blanc Cement Products	Color: Earthstone
	GFM-3	Burnished Block	Grand Blanc Cement Products	Color: Meadow Brook
	GFM-4	Burnished Block	Grand Blanc Cement Products	Color: Forensic
	GFM-5	Burnished Block	Grand Blanc Cement Products	Color: Earthstone
	GFM-6	Burnished Block	Grand Blanc Cement Products	Color: Meadow Brook
047200	CAST STONE			
	CS-1	Cast Stone	Royal Stone	Color: Standard Buff
055123	STAIR RAILING AND STRINGERS			
		Stringers		Color: Painted SW 7019 Gauntlet Gray
		Railings		Color: Painted SW 7600 Bolero
064023	INTERIOR ARCHITECTURAL WOODWORK			
	Interior Finish Wood	Hard Maple	Hard Maple Paneling, Trim, and Bead Board	Color: To Match Flush Wood Doors WD-1
074213.53	METAL SOFFIT PANELS			
	MSP-1	Metal Soffit Panels	Pac-Clad 750 Full Vent Soffit Panels	Manufacturer's Full Range of Standard Colors
076200	SHEET METAL FLASHING & TRIM			
	MLT-1	Sheet Metal	Pac-Clad	Color: Silver
	MLT-2	Sheet Metal	Pac-Clad	Color: Musket Gray

MATERIAL FINISH / COLOR SCHEDULE

PARTNERS 21-146
 MATERIAL SCHEDULE
 000200-2

Spec Section	Item	Description	Product Specified	Finish / Color
079200	JOINT SEALANTS			
				Manufacturer's Full Range of Standard Colors
081416	FLUSH WOOD DOORS			
	WD-1	Pre-finished Wood Door	Masonsite Aspiro	Species: White Maple, Plain Sliced, Stain: Cinnamon
083500	FOUR FOLD DOORS			
		Four Fold Doors	International Door, Inc	Interior and Exterior: To match SW: 7600 Bolero
083463	BALLISTIC RATED WOOD DOOR ASSEMBLIES			
	BR-3	Ballistic Rated Wd. Door	Total Security Systems	Color: To Match Flush Wood Doors WD-1
083613	SECTIONAL DOOR			
		Sectional Door		Interior and Exterior: To match SW: 7600 Bolero
084113	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS			
	ANOD-1		Tubelite	Color: Clear Anodized
084115	FIBERGLASS REINFORCED POLYESTER DOORS			
	FRP	Fiberglass Reinforced	Special-Lite, INC	Manufacturer's Full Range of Standard Colors
085113	ALUMINUM WINDOWS			
	Operable Windows	Alum. Awning Windows	Tubelite	Color: Clear Anodized
085800	BALLISTIC RATED TRANSACTION WINDOWS			
	TW-1	Transaction Window	Total Security Systems	Color: Clear Anodized
089119	FIXED LOUVERS			
		Fixed Louvers	Greenheck	Bronzed Anodized Aluminum

MATERIAL FINISH / COLOR SCHEDULE

PARTNERS 21-146
MATERIAL SCHEDULE
000200-3

Spec Section	Item	Description	Product Specified	Finish / Color
093000	PORCELAIN / CERAMIC TILE			
	PT-1	Porcelain Tile	Virginia Tile - Urban Living - 2" x 2"	Color: Tan
	PT-2	Porcelain Tile	Virginia Tile - Urban Living - 6" x 12" Cove Base	Color: Tan
	PT-3	Ceramic Tile	American Olean, Color Story, 3" x 6"	Color: Calm Matte 0036
	PT-4	Ceramic Tile	American Olean, Color Story, 6" x 6"	Color: Ice White 0025
	PT-5	Ceramic Tile	American Olean, Color Story, 1/2" x 12"	Color: Shadow
	PT-6	Ceramic Tile	American Olean, Linea 2" x 6" Chair Rail	Color: Ice White 0025
	PT-7	Porcelain Tile	Crossville, Owen Stone, 12" x 24"	Color: Slipper
	PT-8	Porcelain Tile	Crossville, Owen Stone, 6" x 12" Cove Base	Color: Slipper
	PT-9	Ceramic Tile	American Olean, Color Story, 3" x 6"	Color: Ice White 0025
	PT-10	Ceramic Tile	American Olean, Color Story, 3" x 6"	Color: Scarlet 0010
		Grout	TEC, for PT-1, PT-2, PT-7, & PT-8	Color: Charcoal Gray
095123	ACOUSTIC TILE CEILINGS			
	ACT-1	Acoustical Ceiling Tiles	USG, Olympia Micro Acoustical Panel, 2' x 2' x 3/4"	Color: White
096513	RESILIENT WALL BASE AND ACCESSORIES			
	RB-1	Rubber Wall Base	Roppe, 700 Series, 4"	Color: 114 Lunar Dust
	RB-2	Rubber Wall Base	Roppe, 700 Series, 4"	Color: 100 Black
096519	RESILIENT TILE FLOORING			
	RTF-1	Resilient Tile Flooring	Nora by Interface, Norament 926 Arago	Color: Calm 5178
096566	RESILIENT ATHLETIC FLOORING			
	AF-1	Resilient Athletic Flooring	Mats Inc., Decathlon	Color: Gray
096813	CARPET TILE			
	CPT-1	Walk Off Carpet Tile	J and J Flooring, Incognito Walk-off Modular, 24" x 24"	Color: 1837 Operative
	CPT-2	Carpet Tiles	J and J Flooring, Kinetex, Umbra II Stripe, 18" x 36"	Color: 1789 Shadow Stripe
	CPT-3	Carpet Tiles	J and J Flooring, Kinetex, Pop, 24" x 24"	Color: 1712 Rojo

MATERIAL FINISH / COLOR SCHEDULE

PARTNERS 21-146
 MATERIAL SCHEDULE
 000200-4

Spec Section	Item	Description	Product Specified	Finish / Color
099113	EXTERIOR PAINTING			
				Exposed Steel Lintels - SW: 7019 Gauntlet Gray
099123	INTERIOR PAINTING			
	PNT-1	Paint	Sherwin Williams	SW: 7641 Colonnade Gray
	PNT-2	Paint	Sherwin Williams	SW: 7007 Ceiling Bright White
	PNT-3	Paint	Sherwin Williams	SW: 7019 Gauntlet Gray
	PNT-4	Paint	Sherwin Williams	SW: 7600 Bolero
	PNT-5	Paint	Sherwin Williams	SW: 6990 Caviar
	EP-PNT-1	Paint	Sherwin Williams	SW: 7641 Colonnade Gray
	EP-PNT-2	Paint	Sherwin Williams	SW: 7019 Gauntlet Gray
	EP-PNT-3	Paint	Sherwin Williams	SW: 7600 Bolero
099300	STAINING AND TRANSPARENT FINISHING			
	ST-1	Wood Stain		Color: To Match WD-1
099726	SELF-LEVELING POLYURETHANE-CEMENT FLOOR FINISH			
	EP-1	Epoxy Flooring	Sikafloor	Color: Oxford Gray
	EP-2	Epoxy Flooring	Sikafloor	Color: Signal White
	EP-3	Epoxy Flooring	Sikafloor	Color: Traffic Red
102600	WALL AND DOOR PROTECTION			
		Corner Guards	Acrovyn	To Match Wall Colors: Manufacturer's Full Range of Standard Colors
105113	METAL LOCKERS			
		Turnout Gear (PPE) Lockers		Color: Red

MATERIAL FINISH / COLOR SCHEDULE

PARTNERS 21-146
 MATERIAL SCHEDULE
 000200-5

Spec Section	Item	Description	Product Specified	Finish / Color
122413	ROLLER WINDOW SHADES			
	RS-1	Window Treatments	Draper, SunBloc SB9100	Color: SB9185 Linge
	RS-2	Window Treatments	Draper, SheerWeave PW4550 5%	Room Darkening: PW4650-P10 Granite
123216	MANUFACTURED CASEWORK			
	PL-1	Plastic Laminate	Wilsonart	Color: Mushroom 5013
123661.16	SOLID SURFACING COUNTERTOPS			
	SS-1	Solid Surface	Corian Solid Surface	Color: Sorrel
	SS-2	Solid Surface	LX Hausys HI-MACS	Color: Terrazzo Moderna

SECTION 002213 - 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 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 1 - DEFINITIONS

- A. No modifications.

1.4 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 Michigan 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.

D. Add Section 2.1.7:

1. 2.1.7 – The Bidder understands that this project is a prevailing wage project. Refer to Prevailing Wages Specification Section 003110 for additional information.

1.5 ARTICLE 3 - BIDDING DOCUMENTS

- A. Delete Paragraph 3.1.1 in its entirety and substitute the following:
 - 1. 3.1.1 - Bidders may obtain bidding documents in electronic form as identified on the Advertisement for Bid.

- B. Add Section 3.3.5:
 - 1. 3.3.5 - Where the Contractor chooses to use an item approved by request but other than one shown on the details or specified, he shall be responsible for the coordination of any necessary changes in other work, and shall bear the cost of such changes.

- C. 3.4 - Addenda:
 - 1. Delete Section 3.4.3 and replace with the following:
 - a. 3.4.3 - Addenda may be issued at any time prior to the receipt of bids.

 - 2. 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.

1.6 ARTICLE 4 - BIDDING PROCEDURES

- A. 4.1 - Preparation of Bids:
 - 1. 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. Delete Section 4.2.1 in its entirety and substitute the following:
 - 1. 4.2.1 - No bid will be considered, unless it is accompanied by a certified check or acceptable Bid Bond payable without condition to the Owner, in an amount equal to (5%) of the total bid. The certified check or Bid Bond which must accompany each bid is required as a guarantee that the bidder will enter into a contract with the Owner for the work described in the proposal and furnish a performance and payment bond and certificates of insurance as specified after notice by the Owner or Architect that contracts have been awarded to him and are ready for execution.

- C. Add Section 4.2.3.1:
 - 1. 4.2.3.1 - The Bid Security of the three lowest bidders will be retained until the contract has been awarded and executed, but not longer than (100) days. The Bid Security of other bidders will be returned within a reasonable time after the opening of bids.

 - D. 4.3 – Submission of Bids
 - 1. Add Section 4.3.5: The Bidder shall submit with their bid the following information:
 - a. A completed Contractor's Qualification Statement per Specification section 003111.
 - b. Bid Security.

 - E. 4.4 - Modification or Withdrawal of Bids:
 - 1. Add Section 4.4.1.1:
 - a. 4.4.1.1 – Bids may not be withdrawn for a period of ninety (90) days from the bid opening date.

 - F. 4.5 - Break-Out Pricing Bid Supplement:
 - 1. Add Section 4.5:
 - a. 4.5 - Provide detailed cost breakdowns (schedule of values) no later than one business day following Architect's request during the Architect's post bid review phase.

 - G. 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 during the Architect's post bid review phase. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Upon award of construction contract, the successful bidder shall not change subcontractors, suppliers, or manufacturers from those submitted to Architect during the post bid review process, without approval of Architect.
- 1.7 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 with the bid as well as following the 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.

1.8 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Add Section 6.1.1:

- a. 6.1.1 - Contractor's Qualification Statement is to be submitted with bid.

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.

1.9 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Sections 7.1.1.1 – 7.1.1.3:

- 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. 7.1.1.2 – Contractor to provide Maintenance and Guarantee Bond in an amount equal to the Contract Amount for the workmanship and materials for the work identified in the Agreement and said Bond shall cover a six year period after completion of the project and final written acceptance and issuance of final payment by the Owner.
- c. 7.1.1.3 – Refer to the City of Warren Draft Contract for additional information regarding bonds.

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 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. 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.

1.10 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 through Architect 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.
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 SECTION 002213

SECTION 003000 –REQUIRED BID SUBMISSION MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Following this page is the Bid Form. Bidder must completely fill out the Bid Form and Submit electronically, by the date and time specified.
- B. Bidder must submit with the bid, "Bid Security" as described in specifications section 002213.
- C. Bidder must submit a Complete Contractor's Qualification Statement in accordance with Specification Section 003111.

END OF SECTION 003000

CITY OF WARREN PROJECT NUMBER: ITB-W-0912

BID PROPOSAL FOR: **City of Warren – New Fire Station No. 1 and New Fire Station No. 5**

BID TO: **Bids shall be submitted electronically through the MITN site.**

BID DUE DATE: **JULY 19, 2023; 12:30PM**

BIDDERS NAME: _____

We have examined the Contract Documents for the proposed **City of Warren – New Fire Station No. 1 and New Fire Station No. 5** project as prepared by PARTNERS in Architecture, PLC.

In accordance therewith, the undersigned proposes to furnish all labor and materials for construction as set forth in the Contract Documents, including the following Addenda, if any (fill in the addenda number, thus confirming receipt):

Addendum Number _____ Addendum Number _____

Addendum Number _____ Addendum Number _____

1. Accompanying the proposal is a bid security for work required to be furnished by the Contract Documents, the same being subject to forfeiture in the event of default by the undersigned.
2. I agree to complete the Project, by the dates listed in Specification Section 011000 – Summary; provided that a notice to proceed is issued within thirty (30) days.
3. I understand that the Owner reserves the right to reject any or all bids, and it is agreed that this bid may not be withdrawn for a period of ninety (90) days from the opening thereof.
4. I understand that the Owner reserves the right to select a single contractor to construct both Fire Station buildings or two separate contractors to construct a single building each.
5. Attached herewith are the documents requested in the Supplementary Instructions to Bidders, Specification Section 002213, paragraph 4.3.5.

A. BASE BIDS: (Insert a base bid amount for Fire Station No.1, Fire Station No. 5, and a combined bid to construct both projects, in the blanks provided below).

1. FIRE STATION NO. 1 – Base Bid:

_____ Dollars \$ _____
(Write out bid amount)

2. FIRE STATION NO. 5 – Base Bid:

_____ Dollars \$ _____
(Write out bid amount)

3. COMBINED BID FOR FIRE STATION NO. 1 and FIRE STATION NO.5 – Base Bid:

_____ Dollars \$ _____
(Write out bid amount)

B. ALLOWANCES: Refer to section 012100 for a complete description.
(These amounts are included in the "Base Bid" amounts listed above)

1. **FIRE STATION NO. 1** (Project 21-146A)
- a. Allowance No. 1: Undercutting Subgrade @ Building Areas \$ _____
(150 cubic yards - This allowance should correlate with unit price #1)
(Enter value of allowance, based on quantity and unit price)

 - b. Allowance No. 2: Undercutting Subgrade @ Paved Areas \$ _____
(100 cubic yards - This allowance should correlate with unit price #2)
(Enter value of allowance, based on quantity and unit price)
2. **FIRE STATION NO. 5** (Project 21-146B)
- a. Allowance No. 1: Undercutting Subgrade @ Building Areas \$ _____
(150 cubic yards - This allowance should correlate with unit price #1)
(Enter value of allowance, based on quantity and unit price)

 - b. Allowance No. 2: Undercutting Subgrade @ Paved Areas \$ _____
(100 cubic yards - This allowance should correlate with unit price #2)
(Enter value of allowance, based on quantity and unit price)

C. UNIT PRICES: Refer to section 012200 for a complete description.

1. Unit Price No. 1: Undercutting Subgrade at Building Areas \$ _____ per Cu. Yd.
(Enter value of unit price)
2. Unit Price No. 2: Undercutting Subgrade at Paved Areas \$ _____ per Cu. Yd.
(Enter value of unit price)

D. SCHEDULE: Refer to Specification Section 011000 for schedule requirements.

(Fill in proposed substantial completion date)

E. NON-IRAN LINKED BUSINESSES

By signing below, I certify and agree on behalf of myself and the company submitting this proposal the following: (1) that I am duly authorized to legally bind the company submitting this proposal; and (2) that the company submitting this proposal is not an "Iran linked business," as that term is defined in Section 2(e) of the Iran Economic Sanctions Act, being Michigan Public Act No. 517 of 2012; and (3) that I and the company submitting this proposal will immediately comply with any further certifications or information submissions requested by the City in this regard.

F. COMPANY / CONTACT INFORMATION

Company Name: _____

Contact Name: _____

Address: _____

Phone Number: _____ Cell Number: _____

Email: _____

Corporate Officer Name: _____ Title _____

Corporate Officer Signature: _____ Date: _____

Federal ID Number : _____

END OF BID FORM

SECTION 003110 – PREVAILING WAGES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Attention is directed to Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

PART 2 – SCOPE

2.1 PREVAILING WAGES

- A. In any Agreement entered into pursuant to this advertisement, the Contractor shall pay the prevailing wages and fringe benefits for all Work. The prevailing wage and fringe benefit rates are included immediately behind this Section
- B. The Contractor shall be financially responsible for the payment of prevailing wages by all Subordinate Parties that are subject to the prevailing wage law for Work on the Project.
- C. The Contractor shall not misclassify any work assignments, but shall in each and every case follow proper jurisdictional assignments.
- I. The Contractor shall assure that any persons paid at apprentice rates under the Act are properly classified as apprentices by actual participation in a BAT certified program or as may otherwise be permitted.

END OF SECTION 003110

Prevailing Wage Rates for State Funded Projects

Official Rates

Macomb County

Page 1 of 23

<u>Classification</u>		Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description						
Boilermaker							
Boilermaker		B0169	12/13/2021	\$72.47	\$107.55	\$142.63	H H H H H H D Y

Apprentice Rates:

1st Period	\$53.53	\$79.15	\$104.75
2nd Period	\$55.14	\$81.56	\$107.97
3rd Period	\$56.73	\$83.94	\$111.15
4th Period	\$58.31	\$86.31	\$114.31
5th Period	\$59.85	\$88.62	\$117.39
6th Period	\$63.03	\$93.39	\$123.75
7th Period	\$66.17	\$98.10	\$130.03
8th Period	\$69.32	\$102.83	\$136.33

Bricklayer							
Bricklayer		BR2-B	12/3/2021	\$61.93	\$92.90	\$123.86	H H H H H H D Y

Apprentice Rates:

1st Period	\$40.60	\$60.90	\$81.20
2nd Period	\$42.47	\$63.71	\$84.94
3rd Period	\$44.33	\$66.49	\$88.66
4th Period	\$46.19	\$69.29	\$92.38
5th Period	\$48.05	\$72.07	\$96.10
6th Period	\$49.91	\$74.87	\$99.82
7th Period	\$51.78	\$77.67	\$103.56
8th Period	\$53.64	\$80.46	\$107.28

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Carpenter							
DiverFour 10s allowed M-Sat; double time due when over 12 hours worked per day		CA 687 D	12/1/2021	\$74.87	\$96.58	\$118.28	X X H X X H H D Y
Comment	Make up day allowed Saturday						
Carpet and Resilient Floor Layer, (does not include installation of prefabricated formica & parquet flooring which is to be paid carpenter rate)		CA1045	12/1/2021	\$57.45	\$81.74	\$106.03	X X H X X X X D N

Apprentice Rates:

1st 6 months	\$32.44	\$44.23	\$56.01
2nd 6 months	\$33.17	\$45.32	\$57.47
3rd 6 months	\$35.58	\$48.94	\$62.29
4th 6 months	\$38.01	\$54.12	\$69.21
5th 6 months	\$40.44	\$56.23	\$72.01
6th 6 months	\$42.87	\$59.87	\$76.87
7th 6 months	\$45.30	\$63.52	\$81.73
8th 6 months	\$47.73	\$67.16	\$86.59

Carpenterfour 10s allowed Mon-Sat; double time due when over 12 hours worked per day		CA687Z1	12/1/2021	\$64.50	\$82.08	\$99.66	X X H X X H H D Y
Comment	Make up day allowed Saturdays						

Apprentice Rates:

1st year	\$39.56	\$49.23	\$58.90
3rd 6 months	\$42.34	\$52.89	\$63.44
4th 6 months	\$45.10	\$56.53	\$67.95
5th 6 months	\$47.87	\$60.18	\$72.48
6th 6 months	\$50.64	\$63.83	\$77.01
7th 6 months	\$53.42	\$67.49	\$81.55
8th 6 months	\$56.20	\$71.15	\$86.09

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
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PiledriverFour 10s allowed Monday-Saturday; double time due when over 12 hours worked per day	CA687Z1P	12/1/2021	\$64.50	\$82.08	\$99.66	X X H X X H H D Y
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Comment Make up day allowed
 Saturday

Apprentice Rates:

1st 6 months	\$39.56	\$49.23	\$58.90
2nd 6 months	\$45.10	\$56.53	\$67.95
3rd 6 months	\$50.64	\$63.83	\$77.01
4th 6 months	\$56.20	\$71.15	\$86.09

Cement Mason

Cement Mason	BR2-CM	12/3/2021	\$58.90	\$84.12	\$109.33	X X H H H H H D Y
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Apprentice Rates:

1st Period	\$39.26	\$54.86	\$70.45
2nd Period	\$41.72	\$58.55	\$75.37
3rd Period	\$44.22	\$62.30	\$80.37
4th Period	\$46.73	\$66.06	\$85.39
5th Period	\$49.19	\$69.75	\$90.31
6th Period	\$51.71	\$73.53	\$95.35

Cement Mason	CE514-W	11/29/2021	\$52.82	\$74.60	\$96.37	H H D H H H H D Y
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Apprentice Rates:

1st 6 Months	\$34.23	\$46.71	\$59.19
2nd 6 Months	\$36.30	\$49.82	\$63.33
3rd 6 Months	\$38.39	\$52.95	\$67.51
4th 6 Months	\$40.47	\$56.07	\$71.67
5th 6 Months	\$42.54	\$59.18	\$75.81
6th 6 Months	\$44.63	\$62.31	\$79.99

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
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Drywall

Drywall Finishers	CE514-DF	12/9/2021	\$51.86	\$67.66	\$83.46	H H H H H H H D Y
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Apprentice Rates:

1st period	\$39.22	\$48.70	\$58.18
2nd period	\$40.80	\$51.07	\$61.34
3rd period	\$43.96	\$55.81	\$67.66
4th period	\$48.70	\$62.92	\$77.14

Drywall Taper	Four 10s allowed Monday-Thursday	PT-22-D	1/7/2022	\$45.91	\$59.74	\$73.56	H H D H D D D D Y
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Comment Make up day allowed
Friday make-up day for bad weather or holidays

Apprentice Rates:

First 3 months	\$32.08	\$38.99	\$45.90
Second 3 months	\$34.85	\$43.14	\$51.44
Second 6 months	\$37.62	\$47.30	\$56.98
Third 6 months	\$40.38	\$51.44	\$62.50
4th 6 months	\$41.76	\$53.51	\$65.26

Electrician

Inside Wireman	EC-58-IW	11/12/2021	\$71.28	\$98.14	\$121.40	H H H H H H H D N
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Apprentice Rates:

1st Period	\$45.69	\$59.77	\$70.23
2nd Period	\$48.01	\$63.24	\$74.87
3rd Period	\$50.34	\$66.74	\$79.53
4th Period	\$52.66	\$70.22	\$84.17
5th Period	\$54.99	\$73.71	\$88.83
6th Period	\$59.65	\$80.70	\$98.15

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
	Sound and Communication Installer	EC-58-SC	11/12/2021	\$44.79	\$60.31	\$75.82	H H H H H H H D Y

Apprentice Rates:

Period 1	\$29.28	\$37.04	\$44.79
Period 2	\$30.84	\$39.99	\$48.72
Period 3	\$32.38	\$41.68	\$50.99
Period 4	\$33.94	\$44.03	\$54.11
Period 5	\$35.48	\$46.34	\$57.19
Period 6	\$37.04	\$48.67	\$60.31

	Sound and Communication Technician I	EC-58-SCT	11/12/2021	\$52.52	\$71.89	\$91.27	H H H H H H H D Y
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Elevator Constructor

	Elevator Constructor	EL 36	11/16/2021	\$96.27	\$151.73	\$151.73	D D D D D D D D Y
	Make up day allowed						

Apprentice Rates:

1st Year Apprentice	\$70.42	\$100.92
2nd Year Apprentice	\$75.97	\$112.02
3rd Year Apprentice	\$78.74	\$117.56
4th Year Apprentice	\$84.29	\$128.66

Glazier

	Glazier If a four 10 hour day workweek is scheduled, four 10s must be consecutive, M-F.	GL-357	12/9/2021	\$53.55	\$70.10	\$86.65	H H H H H H H D Y
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Apprentice Rates:

1st 6 months	\$37.00	\$45.27	\$53.55
2nd 6 months	\$37.75	\$46.40	\$55.05
3rd 6 months	\$41.97	\$52.73	\$63.49
4th 6 months	\$43.62	\$55.21	\$66.79
5th 6 months	\$45.27	\$57.68	\$70.09
6th 6 months	\$46.93	\$60.17	\$73.41
7th 6 months	\$48.59	\$62.66	\$76.73
8th 6 months	\$51.89	\$67.61	\$83.33

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
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Heat and Frost Insulator

Heat and Frost Insulators and Asbestos Workers 4-10s AS25 1/18/2022 \$62.65 \$78.41 \$94.16 H H H H H H H D Y
 must be worked a minimum of 2 weeks consecutively, Monday thru Thursday. Hours worked in excess of 10 will be paid at double time. Hours worked on the fifth day, Monday thru Friday @ time and half

Comment

Four 10s must be worked for a minimum of 2 consecutive weeks. OVERTIME is different on a four 10 week. OT is 2x for hours beyond 10. All hours on fifth day, M-F require time and one half. Sat first 8 hours, 1.5, all hours after 8 require double time.

Apprentice Rates:

1st Year	\$46.90	\$54.78	\$62.66
2nd Year	\$50.05	\$59.50	\$68.96
3rd Year	\$53.20	\$64.23	\$75.26
4th Year	\$56.35	\$68.96	\$81.56

Spray Insulation	AS25S	6/2/2016	\$25.29	\$36.51		X X X H H H H H N
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Ironworker

Reinforced Iron Work IR-25-RF 12/16/2021 \$63.59 \$92.70 \$121.81 H H D H D D D D N
 Make up day allowed

Apprentice Rates:

Level 1	\$47.70	\$68.81	\$89.91
Level 2	\$48.76	\$70.40	\$92.03
Level 3	\$51.49	\$74.50	\$97.49
Level 4	\$54.22	\$78.59	\$102.95
Level 5	\$56.93	\$84.77	\$112.62
Level 6	\$58.46	\$84.95	\$111.43

Rigging Work	IR-25-RIG	12/16/2021	\$70.50	\$101.32	\$132.14	H H H H H H H D N
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Apprentice Rates:

Level 1 & 2	\$45.08	\$64.21	\$83.34
Level 3	\$47.97	\$68.55	\$89.12
Level 4	\$50.88	\$72.92	\$94.94
Level 5	\$53.77	\$77.24	\$100.72
Level 6	\$56.69	\$84.41	\$112.12
Level 7	\$59.57	\$85.95	\$112.32
Level 8	\$62.49	\$90.33	\$118.16

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
	Structural, ornamental, welder and pre-cast If bad weather, Friday may be a make up day. If holiday celebrated on a Monday, 4 10s may be worked Tuesday thru Friday. Make up day allowed	IR-25-STR	12/22/2021	\$70.57	\$102.45	\$134.32	H H H H H H D D Y
	Apprentice Rates:						
	Levels 1 & 2			\$43.60	\$61.99	\$80.38	
	Level 3			\$46.49	\$66.33	\$86.16	
	Level 4			\$49.40	\$70.70	\$91.98	
	Level 5			\$52.29	\$78.28	\$104.38	
	Level 6			\$55.21	\$79.41	\$103.60	
	Level 7			\$58.09	\$83.73	\$109.36	
	Level 8			\$61.01	\$90.89	\$120.76	
Laborer							
	Construction Laborer, Demolition Laborer, Mason Tender, Carpenter Tender, Drywall Handler, Concrete Laborer, Cement Finisher tender, concrete chute and concrete Bucket Handler, Concrete Laborer Comment Make up day allowed Saturday	L1076-A-A	1/7/2022	\$46.03	\$65.55	\$85.06	H H H H H H H D Y
	Apprentice Rates:						
	0-1,000 work hours			\$39.75	\$56.13	\$72.50	
	1,001-2,000 work hours			\$41.00	\$58.00	\$75.00	
	2,001-3,000 work hours			\$42.26	\$59.89	\$77.52	
	3,001-4,000 work hours			\$44.77	\$63.65	\$82.54	
	Signal man (on sewer & caisson work); air,electric or gasoline tool operator (including concrete vibrator operator,acetylene torch & air hammer operator); scaffold builder, caisson worker Comment Make up day allowed Saturday	L1076-A-B	1/7/2022	\$46.32	\$65.98	\$85.64	H H H H H H H D Y
	Lansing Burner, Blaster & Powder Man Comment Make up day allowed Saturday, If conditions beyond the employer/employee's control prevent one or more hours of working during Mon-Fri, the employer may choose to work up to 10 hour straight time weekdays.	L1076-A-C	1/7/2022	\$46.86	\$64.89	\$82.92	H H H H H H H D Y
	Furnance battery heater tender, burning bar & oxy-acetylene gun Comment Make up day allowed Saturday	L1076-A-D	1/7/2022	\$46.58	\$66.37	\$86.16	H H H H H H H D Y

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Cleaner/sweeper laborer, furniture laborer		L1076-A-E	1/7/2022	\$40.58	\$57.37	\$74.16	H H H H H H D Y
Comment	Make up day allowed Saturday						
Expediter man, topman and/or bottom man (blast furnace work or battery work)		L1076-A-F	1/7/2022	\$47.40	\$67.70	\$88.00	H H H H H H D Y
Comment	Saturday						
Laborer -Wall and ceiling material handler, plasterer tender, mortar mixer and plastering machine operator		L1076-A-W	12/1/2021	\$46.46	\$59.17	\$71.87	X X H X H H D Y
Comment	Make up day allowed Saturday make up day due to conditions beyond control or holiday						
	Apprentice Rates:						
	0-1,000 Hours			\$40.11	\$49.64	\$59.17	
	1,001-2,000 Hours			\$41.38	\$51.55	\$61.71	
	2,001-3,000 Hours			\$42.65	\$53.45	\$64.25	
	3,001-4,000 Hours			\$45.19	\$57.26	\$69.33	
Laborer Road Class 1: asphalt shoveler or loader, yard man, fence erector tender, dumper, joint filling, form setting, form stripper, pavement reinforcing, waterproofing, seal coating, bridge painting, sandblasting, pressure grouting, RC equipment		MITA-RZ1-C1	1/5/2022	\$44.32	\$59.58	\$74.84	H H H H H H D Y
	Apprentice Rates:						
	3,001-4,000 hours			\$43.02	\$57.64	\$72.24	
	2,001-3,000			\$40.41	\$53.72	\$67.02	
	1,001-2,000 hours			\$39.11	\$51.77	\$64.42	
	0-1,000 hours			\$37.80	\$49.80	\$61.80	
Laborer Road Class 2: mixer operator, air or electric tool operator, spreader, boxman, concreter paddler, power chain saw operator, paving patch truck dumper, tunnel mucker, concrete saw operator, dry pack machine and roto-mill grounds person		MITA-RZ1-C2	1/5/2022	\$44.45	\$59.78	\$75.10	H H H H H H D Y
	Apprentice Rates:						
	3,001-4,000 hours			\$43.14	\$57.82	\$72.48	
	2,001-3,000 hours			\$40.52	\$53.88	\$67.24	
	1,001-2,000 hours			\$39.21	\$51.92	\$64.62	
	0-1,000 hours			\$37.90	\$49.96	\$62.00	

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer Road Class 3:	tunnel miner, finish tenders, guard rail builder, median barrier installer, earth retention barrier and wall installer, fence erector, bottom man, powder man, wagon drill and air track operator, curb and side rail setter	MITA-RZ1-C3	1/5/2022	\$44.63	\$60.05	\$75.46	H H H H H H H D Y
Apprentice Rates:							
				3,001-4,000 hours	\$43.31	\$58.07	\$72.82
				2,001-3,000 hours	\$40.67	\$54.11	\$67.54
				1,001-2,000 hours	\$39.35	\$52.13	\$64.90
				0-1,000 hours	\$38.03	\$50.15	\$62.26
Laborer Road Class 4:	asphalt raker	MITA-RZ1-C4	1/5/2022	\$44.71	\$60.17	\$75.62	H H H H H H H D Y
Apprentice Rates:							
				3,001-4,000 hours	\$43.39	\$58.19	\$72.98
				2,001-3,000 hours	\$40.74	\$54.22	\$67.68
				1,001-2,000 hours	\$39.42	\$52.24	\$65.04
				0-1,000 hours	\$38.09	\$50.24	\$62.38
Laborer Road Class 5:	pipe layers, oxy-gun	MITA-RZ1-C5	1/5/2022	\$44.92	\$60.48	\$76.04	H H H H H H H D Y
Apprentice Rates:							
				3,001-4,000 hours	\$43.59	\$58.49	\$73.38
				2,001-3,000 hours	\$40.92	\$54.48	\$68.04
				1,001-2,000 hours	\$39.59	\$52.49	\$65.38
				0-1,000 hours	\$38.25	\$50.48	\$62.70
Laborer Road Class 6:	line form setter for curb or pavement, asphalt screed checker/screw man on asphalt paving machines	MITA-RZ1-C6	1/5/2022	\$45.22	\$60.93	\$76.64	H H H H H H H D Y
Apprentice Rates:							
				3,001-4,000 hours	\$43.87	\$58.91	\$73.94
				2,001-3,000 hours	\$41.17	\$54.86	\$68.54
				1,001-2,000 hours	\$39.83	\$52.85	\$65.86
				0-1,000 hours	\$38.48	\$50.82	\$63.16

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Laborer Underground - Tunnel, Shaft & Caisson							
Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.	LAUCT-Z1-1	1/4/2022	\$40.67	\$52.48	\$64.29	X X X X X X X D Y	
Apprentice Rates:							
	0-1,000 work hours		\$34.45	\$43.16	\$51.85		
	1,001-2,000 work hours		\$36.54	\$46.29	\$56.03		
	2,001-3,000 work hours		\$37.57	\$47.84	\$58.09		
	3,001-4,000 work hours		\$39.64	\$50.94	\$62.23		
Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder.	LAUCT-Z1-2	1/4/2022	\$40.78	\$52.65	\$64.51	X X X X X X X D Y	
Apprentice Rates:							
	0-1,000 work hours		\$35.58	\$44.85	\$54.11		
	1,001-2,000 work hours		\$36.62	\$46.41	\$56.19		
	2,001-3,000 work hours		\$37.66	\$47.97	\$58.27		
	3,001-4,000 work hours		\$39.74	\$51.09	\$62.43		
Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, con	LAUCT-Z1-3	1/4/2022	\$40.84	\$52.74	\$64.63	X X X X X X X D Y	
Apprentice Rates:							
	0-1,000 work hours		\$35.63	\$44.92	\$54.21		
	1,001-2,000 work hours		\$36.67	\$46.48	\$56.29		
	2,001-3,000 work hours		\$37.71	\$48.04	\$58.37		
	3,001-4,000 work hours		\$39.80	\$51.18	\$62.55		
Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.	LAUCT-Z1-4	1/4/2022	\$41.02	\$53.01	\$64.99	X X X X X X X D Y	
Apprentice Rates:							
	0-1,000 work hours		\$35.76	\$45.12	\$54.47		
	1,001-2,000 work hours		\$36.82	\$46.71	\$56.59		
	2,001-3,000 work hours		\$37.87	\$48.28	\$58.69		
	3,001-4,000 work hours		\$39.97	\$51.44	\$62.89		

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
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	Class V - Tunnel, shaft and caisson miner, drill runner, keyboard operator, power knife operator, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars)	LAUCT-Z1-5	1/4/2022	\$41.27	\$53.38	\$65.49	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$35.95	\$45.40	\$54.85	
	1,001-2,000 work hours			\$37.02	\$47.01	\$56.99	
	2,001-3,000 work hours			\$38.08	\$48.60	\$59.11	
	3,001-4,000 work hours			\$40.21	\$51.80	\$63.37	
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	Class VI - Dynamite man and powder man.	LAUCT-Z1-6	1/4/2022	\$41.60	\$53.88	\$66.15	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$36.20	\$45.78	\$55.35	
	1,001-2,000 work hours			\$37.28	\$47.40	\$57.51	
	2,001-3,000 work hours			\$38.36	\$49.02	\$59.67	
	3,001-4,000 work hours			\$40.52	\$52.26	\$63.99	
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	Class VII - Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes and flagstones.	LAUCT-Z1-7	1/4/2022	\$34.88	\$43.80	\$52.71	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$31.16	\$38.22	\$45.27	
	1,001-2,000 work hours			\$31.90	\$39.33	\$46.75	
	2,001-3,000 work hours			\$32.65	\$40.46	\$48.25	
	3,001-4,000 work hours			\$34.14	\$42.69	\$51.23	
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Landscape Laborer							
	Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer, skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders	LLAN-Z1-A	1/4/2022	\$28.80	\$39.48	\$50.15	X X H X X X H D Y
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	Class B2: Skilled Landscape Laborer: small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender, material mover	LLAN-Z1-B	1/4/2022	\$26.80	\$35.98	\$45.65	X X H X X X H D Y

Official Rates

Macomb County

<u>Classification</u>		Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description						
Class D: Inexperienced landscape laborer - individual who has worked less than 90 calendar days		LLAN-Z2-D	1/7/2022	\$15.54	\$23.31	\$31.08	H H H H H H H D N
Operating Engineer							
Crane with boom & jib or leads 120' or longer Comment Double time after 12 hours M-F		EN-324-A120	12/10/2021	\$65.71	\$86.00	\$106.28	X X H H D D D D Y
Crane with boom & jib or leads 140' or longer Work in excess of 12 per day M-F shall be paid at double time.		EN-324-A140	12/10/2021	\$66.53	\$87.23	\$107.92	X X H H D D D D Y
Crane with boom & jib or leads 220' or longer Work in excess of 12 per day M-F shall be paid at double time.		EN-324-A220	12/10/2021	\$66.83	\$87.68	\$108.52	X X H H D D D D Y
Crane with boom & jib or leads 300' or longer Work in excess of 12 per day M-F shall be paid at double time.		EN-324-A300	12/10/2021	\$68.33	\$89.93	\$111.52	X X H H D D D D Y
Crane with boom & jib or leads 400' or longer Work in excess of 12 per day M-F shall be paid at double time.		EN-324-A400	12/10/2021	\$69.82	\$92.16	\$114.50	X X H H D D D D Y
Compressor or welding machine Work in excess of 12 per day M-F shall be paid at double time.		EN-324-CW	12/10/2021	\$54.86	\$69.72	\$84.58	X X H H D D D D Y
Forklift, lull, extend-a-boom forklift Work in excess of 12 per day M-F shall be paid at double time.		EN-324-FL	12/10/2021	\$62.17	\$80.69	\$99.20	X X H H D D D D Y
Fireman or oiler Work in excess of 12 per day M-F shall be paid at double time.		EN-324-FO	12/10/2021	\$53.83	\$68.18	\$82.52	X X H H D D D D Y
Regular crane, job mechanic, concrete pump with boom Work in excess of 12 per day M-F shall be paid at double time.		EN-324-RC	12/10/2021	\$64.85	\$84.71	\$104.56	X X H H D D D D Y

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
	Regular engineer, hydro-excavator, remote controlled concrete breaker Work in excess of 12 per day M-F shall be paid at double time.	EN-324-RE	12/10/2021	\$63.88	\$83.25	\$102.62	X X H H D D D D Y
Apprentice Rates:							
	0-999 hours			\$46.35	\$58.48	\$70.61	
	1,000-1,999 hours			\$48.09	\$61.10	\$74.09	
	2,000-2,999 hours			\$49.82	\$63.68	\$77.55	
	3,000-3,999 hours			\$51.55	\$66.28	\$81.01	
	4,000-4,999 hours			\$53.29	\$68.90	\$84.49	
	5,000-5,999 hours			\$55.01	\$71.47	\$87.93	
Operating Engineer - DIVER							
	Diver/Wet Tender/Tender/Rov Pilot/Rov Tender	GLF D	12/16/2021	\$52.81	\$78.57	\$104.32	H H H H H H H D N
Operating Engineer - Marine Construction							
	Diver/Wet Tender, Engineer (hydraulic dredge) Make up day allowed	GLF-1	1/7/2022	\$78.97	\$102.47	\$125.97	X X H H H H H D Y
	<u>Subdivision of county</u>	all Great Lakes, islands therein, & connecting & tributary waters					
	Crane/Backhoe Operator, 70 ton or over Tug Operator, Mechanic/Welder, Assistant Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender Make up day allowed	GLF-2	1/7/2022	\$77.47	\$100.22	\$122.97	X X H H H H H D Y
	<u>Subdivision of county</u>	All Great Lakes, islands therein, & connecting & tributary waters					
	Friction, Lattice Boom or Crane License Certification30 Make up day allowed	GLF-2B	1/7/2022	\$78.97	\$102.47	\$125.97	X X H H H H H D Y
	<u>Subdivision of county</u>	All Great Lakes, islands, therein, & connecting & tributary waters					
	Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs or more), Tug/Launch Operator, Loader, Dozer on Barge, Deck Machinery Make up day allowed	GLF-3	1/7/2022	\$72.92	\$93.40	\$113.87	X X H H H H H D Y
	<u>Subdivision of county</u>	All Great Lakes, islands therein, & connecting & tributary waters					
	Deck Equipment Operator, (Machineryman/Fireman), (4 equipment units or more), Off Road Trucks, Deck Hand, Tug Engineer, & Crane Maintenance 50 ton capacity and under or Backhoe 115,000 lbs or less, Assistant Tug Operator Make up day allowed	GLF-4	1/7/2022	\$66.72	\$84.10	\$101.47	X X H H H H H D Y
	<u>Subdivision of county</u>	All Great Lakes, islands therein, & connecting & tributary waters					

Official Rates

County: Statewide

zz alpha web rates

Date Rendered:

2/9/2022

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Operating Engineer Steel Work							
	Forklift, 1 Drum Hoist	EN-324-ef	12/9/2021	\$59.30	\$76.43	\$93.56	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 120' boom or longer	EN-324-SW120	12/10/2021	\$68.61	\$90.40	\$112.18	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 120' boom or longer w/ Oiler	EN-324-SW120-O	12/10/2021	\$69.61	\$91.90	\$114.18	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 140' boom or longer	EN-324-SW140	12/10/2021	\$69.79	\$92.17	\$114.54	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 140' boom or longer W/ Oiler	EN-324-SW140-O	12/10/2021	\$70.79	\$93.67	\$116.54	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Boom & Jib 220' or longer	EN-324-SW220	12/10/2021	\$70.06	\$92.57	\$115.08	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 220' boom or longer w/ Oiler	EN-324-SW220-O	12/10/2021	\$71.06	\$94.07	\$117.08	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Boom & Jib 300' or longer	EN-324-SW300	12/10/2021	\$71.56	\$94.82	\$118.08	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 300' boom or longer w/ Oiler	EN-324-SW300-O	12/10/2021	\$72.56	\$93.20	\$113.84	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Boom & Jib 400' or longer	EN-324-SW400	12/10/2021	\$73.06	\$97.07	\$121.08	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Crane w/ 400' boom or longer w/ Oiler	EN-324-SW400-O	12/10/2021	\$74.06	\$98.57	\$123.08	H H D H H H D D Y
	Comment Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Crane Operator, Job Mechanic, 3 Drum Hoist & Excavator		EN-324-SWCO	12/10/2021	\$68.25	\$89.86	\$111.46	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
	Apprentice Rates:						
	0-999 hours			\$49.22	\$62.96	\$76.70	
	1,000-1,999 hours			\$51.18	\$65.90	\$80.62	
	2,000-2,999 hours			\$53.15	\$68.85	\$84.56	
	3,000-3,999 hours			\$55.11	\$71.80	\$88.48	
	4,000-4,999 hours			\$57.07	\$74.74	\$92.40	
	5,000 hours			\$59.04	\$77.69	\$96.34	
Crane Operator w/ Oiler		EN-324-SWCO-O	12/10/2021	\$69.25	\$91.36	\$113.46	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
Compressor or Welder Operator		EN-324-SWCW	12/10/2021	\$37.03	\$49.48	\$61.92	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
Hoisting Operator, 2 Drum Hoist, & Rubber Tire Backhoe		EN-324-SWHO	12/10/2021	\$67.61	\$88.90	\$110.18	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
Oiler		EN-324-SWO	12/10/2021	\$53.42	\$67.61	\$81.80	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
Tower Crane & Derrick where work is 50' or more		EN-324-SWTD50	12/10/2021	\$69.34	\$91.49	\$113.64	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						
Tower Crane & Derrick 50' or more w/ Oiler		EN-324-SWTD50-O	12/10/2021	\$70.34	\$92.99	\$115.64	H H D H H H D D Y
Comment	Make up day allowed 4 10s allowed M-Th with Friday makeup day because of bad weather						

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Operating Engineer Underground							
Class I Equipment		EN-324A1-UC1	12/10/2021	\$62.64	\$81.46	\$100.27	H H H H H H D Y
	Apprentice Rates:						
	0-999 hours			\$50.40	\$63.56	\$76.71	
	1,000-1,999 hours			\$52.28	\$66.37	\$80.47	
	2,000-2,999 hours			\$54.15	\$69.18	\$84.21	
	3,000-3,999 hours			\$57.09	\$73.07	\$89.04	
	4,000-4,999 hours			\$57.91	\$74.83	\$91.73	
	5,000-5,999 hours			\$59.80	\$77.66	\$95.51	
Class II Equipment		EN-324A1-UC2	12/10/2021	\$57.91	\$74.36	\$90.81	H H H H H H D Y
Class III Equipment		EN-324A1-UC3	12/10/2021	\$57.18	\$73.27	\$89.35	H H H H H H D Y
Class IV Equipment		EN-324A1-UC4	12/10/2021	\$56.61	\$72.41	\$88.21	H H H H H H D Y
Painter							
Painter		CE514-PT	12/9/2021	\$50.12	\$64.80	\$79.73	H H H H H H D Y
	Apprentice Rates:						
	1st period			\$35.19	\$42.41	\$49.87	
	2nd period			\$38.18	\$46.89	\$55.85	
	3rd period			\$41.16	\$51.36	\$61.81	
	4th period			\$45.64	\$58.08	\$70.77	
Pipe and Manhole Rehab							
General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant		TM247	4/17/2015	\$28.20	\$38.20		H H H H H H H N
Tap cutter/CCTV Tech/Grout Equipment Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment		TM247-2	4/17/2015	\$32.70	\$44.95		H H H H H H H N

Official Rates

Statewide County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
CCTV Technician/Combo Unit Operator:	unit driver and operator of cctv unit or combo unit in connection with normal cleaning and televising work	TM247-3	4/17/2015	\$31.45	\$43.07		H H H H H H H H N
Boiler Operator:	unit driver and operator of steam/water heater units and all ancillary equipment associated	TM247-4	4/17/2015	\$33.20	\$45.70		H H H H H H H H N
Combo Unit driver & Jetter-Vac Operator		TM247-5	4/17/2015	\$33.20	\$45.70		H H H H H H H H N
Pipe Bursting & Slip-lining Equipment Operator		TM247-6	4/17/2015	\$34.20	\$47.20		H H H H H H H H N

Pipefitter

Pipefitter, Steamfitter, HVAC-R mechanic	PF-636	11/16/2021	\$77.06	\$100.47	\$118.67		H H D H H D D D Y
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Comment

Four 10s allowed during the week preceding, following and/or the week of a holiday.

Apprentice Rates:

1st & 2nd periods	\$34.00	\$43.98	\$52.60
3rd period	\$35.25	\$45.85	\$55.10
4th period	\$36.25	\$47.35	\$57.10
5th period	\$36.98	\$48.44	\$58.56
6th period	\$38.23	\$50.32	\$61.06
7th period	\$39.48	\$52.20	\$63.56
8th period	\$40.48	\$53.70	\$65.56
9th period	\$41.48	\$55.20	\$67.56
10th period	\$42.91	\$57.34	\$70.42

Plumber

Plumber	PL-98	12/3/2021	\$76.02	\$96.58	\$117.14		H H D H D D D D Y
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Comment

4 tens allowed M-Th or T-F; OT of time and one half required on 11th & 12th hour of any ten hour days

Apprentice Rates:

1st Year	\$27.71	\$36.50	\$45.29
2nd Year	\$31.66	\$41.44	\$51.22
3rd Year	\$33.19	\$43.71	\$54.23

Official Rates

Macomb County

<u>Classification</u>		Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Name	Description						
Roofer							
Commercial Roofer		RO-149-WOM	1/18/2022	\$62.82	\$79.68	\$96.53	X X H X X H H D N
Apprentice Rates:							
				\$48.68	\$58.47	\$68.25	
				\$48.74	\$58.55	\$68.37	
				\$49.25	\$59.32	\$69.39	
				\$50.76	\$61.59	\$72.41	
				\$52.26	\$63.83	\$75.41	
				\$53.77	\$66.10	\$78.43	
				\$55.18	\$68.21	\$81.25	
				\$56.79	\$70.63	\$84.47	
				\$58.27	\$72.85	\$87.43	
Sewer Relining							
Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV system.		SR-I	12/10/2021	\$49.71	\$67.42	\$85.13	H H H H H H H D N
Apprentice Rates:							
				\$39.05	\$51.43	\$63.81	
				\$42.83	\$57.10	\$71.37	
Class II-Operator of hot water heaters and circulation system; water jettors; and vacuum and mechanical debris removal systems and those assisting.		SR-II	12/10/2021	\$47.67	\$64.36	\$81.05	H H H H H H H D N
Sheet Metal Worker							
Sheet Metal Worker A 4 10 schedule may be worked, 4 consecutive days Monday thru Friday.		SHM-80	1/14/2022	\$73.22	\$94.71	\$116.19	H H D H D D D D Y
Apprentice Rates:							
				\$47.64	\$58.39	\$69.13	
				\$49.78	\$61.60	\$73.41	
				\$51.94	\$64.83	\$77.73	
				\$54.08	\$68.05	\$82.01	

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Sprinkler Fitter							
Sprinkler Fitter	4 ten hour days allowed Monday-Friday Double time pay due after 12 hours worked M-F	SP 704	1/7/2022	\$76.92	\$97.18	\$117.43	H H D H D D D D N

Apprentice Rates:

1st Period	\$31.91	\$40.00	\$48.09
2nd Period	\$51.25	\$60.36	\$69.47
3rd Period	\$53.58	\$63.71	\$73.83
4th Period	\$55.91	\$67.04	\$78.17
5th Period	\$58.25	\$70.40	\$82.55
6th Period	\$60.58	\$73.73	\$86.89
7th Period	\$62.91	\$77.08	\$91.24
8th Period	\$65.25	\$80.44	\$95.62
9th Period	\$67.58	\$83.78	\$99.98
10th Period	\$69.91	\$87.12	\$104.33

Tile, Marble and Terrazzo Finisher							
Tile, Marble and Terrazzo Finisher		BR2-F	12/3/2021	\$51.67	\$66.51	\$81.34	H H D H D D D D Y

Apprentice Rates:

1st Period	\$34.76	\$44.41	\$54.05
2nd Period	\$36.24	\$46.63	\$57.01
3rd Period	\$37.72	\$48.85	\$59.97
4th Period	\$39.21	\$51.08	\$62.95
5th Period	\$40.69	\$53.30	\$65.91
6th Period	\$42.17	\$55.52	\$68.87

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
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Title, Marble and Terrazzo Setter

Tile, Marble Terrazzo Setter	BR2-TMT	12/3/2021	\$58.80	\$77.20	\$95.60	H H D H D D D D Y
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Apprentice Rates:

1st Period	\$38.77	\$49.81	\$60.85
2nd Period	\$40.61	\$52.57	\$64.53
3rd Period	\$42.45	\$55.33	\$68.21
4th Period	\$44.29	\$58.09	\$71.89
5th Period	\$46.13	\$60.85	\$75.57
6th Period	\$47.97	\$63.61	\$79.25
7th Period	\$49.81	\$66.37	\$82.93
8th Period	\$51.65	\$69.13	\$86.61

Truck Driver

on all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)	TM-RB1	1/12/2022	\$52.34	\$67.88	\$83.42	H H H H H H H D Y
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of all trucks of 8 cubic yard capacity or over semi, tractor trailer	TM-RB1A	1/12/2022	\$52.49	\$68.11	\$83.72	H H H H H H H D Y
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on euclid type equipment, Pole drier, lowboy, doubles, fuel, bus, water Make up day allowed	TM-RB1B	1/12/2022	\$52.59	\$67.28	\$81.97	H H H H H H H D Y
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Underground Laborer Open Cut, Class I

Construction Laborer	LAUC-Z1-1	1/4/2022	\$40.52	\$52.26	\$63.99	X X X X X X X D Y
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Apprentice Rates:

0-1,000 work hours	\$35.39	\$44.56	\$53.73
1,001-2,000 work hours	\$36.42	\$46.11	\$55.79
2,001-3,000 work hours	\$37.44	\$47.64	\$57.83
3,001-4,000 work hours	\$39.49	\$50.72	\$61.93

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Underground Laborer Open Cut, Class II							
	Mortar and material mixer, concrete form man, signal man, well point man, manhole, headwall and catch basin builder, guard rail builders, headwall, seawall, breakwall, dock builder and fence erector.	LAUC-Z1-2	1/4/2022	\$40.63	\$52.42	\$64.21	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$35.47	\$44.68	\$53.89	
	1,001-2,000 work hours			\$36.50	\$46.23	\$55.95	
	2,001-3,000 work hours			\$37.54	\$47.79	\$58.03	
	3,001-4,000 work hours			\$39.60	\$50.88	\$62.15	
Underground Laborer Open Cut, Class III							
	Air, gasoline and electric tool operator, vibrator operator, drillers, pump man, tar kettle operator, bracers, rodger, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars, etc.), cement finisher, welder, pipe jacking and boring man, wagon	LAUC-Z1-3	1/4/2022	\$40.68	\$52.50	\$64.31	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$35.51	\$44.74	\$53.97	
	1,001-2,000 work hours			\$36.54	\$46.29	\$56.03	
	2,001-3,000 work hours			\$37.58	\$47.85	\$58.11	
	3,001-4,000 work hours			\$39.65	\$50.96	\$62.25	
Underground Laborer Open Cut, Class IV							
	Trench or excavating grade man.	LAUC-Z1-4	1/4/2022	\$40.76	\$52.62	\$64.47	X X X X X X X D Y
Apprentice Rates:							
	0-1,000 work hours			\$35.57	\$44.84	\$54.09	
	1,001-2,000 work hours			\$36.61	\$46.40	\$56.17	
	2,001-3,000 work hours			\$37.65	\$47.96	\$58.25	
	3,001-4,000 work hours			\$39.72	\$51.06	\$62.39	

Official Rates

Macomb County

Classification Name	Description	Classification Number	Last Updated	Straight Hourly	Time and a Half	Double Time	Overtime Provision
Underground Laborer Open Cut, Class V							
	Pipe Layer (including crock, metal pipe, mulitplate or other conduits)	LAUC-Z1-5	1/4/2022	\$40.82	\$52.71	\$64.59	X X X X X X X D Y
	Apprentice Rates:						
	0-1,000 work hours			\$35.62	\$44.91	\$54.19	
	1,001-2,000 work hours			\$36.66	\$46.47	\$56.27	
	2,001-3,000 work hours			\$37.70	\$48.03	\$58.35	
	3,001-4,000 work hours			\$39.78	\$51.15	\$62.51	
Underground Laborer Open Cut, Class VI							
	Grouting man, top man assistant, audio visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work and the installation and repair of water service pipe and appurtenan	LAUC-Z1-6	1/4/2022	\$38.27	\$48.88	\$59.49	X X X X X X X D Y
	Apprentice Rates:						
	0-1,000 work hours			\$33.70	\$42.03	\$50.35	
	1,001-2,000 work hours			\$34.62	\$43.41	\$52.19	
	2,001-3,000 work hours			\$35.53	\$44.78	\$54.01	
	3,001-4,000 work hours			\$37.36	\$47.52	\$57.67	
Underground Laborer Open Cut, Class VII							
	Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.	LAUC-Z1-7	1/4/2022	\$34.89	\$43.81	\$52.73	X X X X X X X D Y
	Apprentice Rates:						
	0-1,000 work hours			\$31.17	\$38.24	\$45.29	
	1,001-2,000 work hours			\$31.91	\$39.34	\$46.77	
	2,001-3,000 work hours			\$32.66	\$40.47	\$48.27	
	3,001-4,000 work hours			\$34.15	\$42.70	\$51.25	

Official Rates

CONTRACTOR'S QUALIFICATION STATEMENT FOR GENERAL CONTRACTORS

CITY OF WARREN NEW FIRE STATION NO. 1 And NEW FIRE STATION NO. 5

INSTRUCTIONS AND PROCEDURES

All Bidders must submit with their bid, a completed AIA A305-1986 Contractor's Qualification Statement, as modified below and containing the additional requested information.

- A. **GENERAL INFORMATION.** The City of Warren is requesting qualifications from interested General Contractors that are submitting a bid for the construction of the City of Warren – New Fire Station No. 1 located at 23211 Van Dyke Avenue, Warren, MI 48089 and New Fire Station No. 5, located at 30619 Schoenherr Road, Warren, MI 48088.

The completed Contractor's Qualification Statements will be evaluated by The City of Warren in conjunction with the submitted bids to determine the lowest responsible bid.

- B. **MINIMUM QUALIFICATION CRITERIA.** Prospective bidders shall have the following minimum qualifications.
1. The Contractor shall have been in business under the present company name for a minimum of ten (10) years and shall not have been declared in default on any construction contract within that time or have any pending judgements.
 2. The Contractor shall have completed at least three (3) municipal / governmental projects (similar to the proposed project) having a construction value of at least \$3,000,000 within the last ten (10) years.
 3. The Contractor shall have demonstrated abilities and documented processes to effectively manage a construction project, maintain a construction schedule and expeditiously close out a project.
 4. The Contractor shall be able to provide a 100% payment and performance bond for the project and must be able to provide the specified insurances.
- C. **CONTRACTOR'S QUALIFICATION STATEMENT.** Contractor shall submit a completed AIA A305-1986 Contractor's Qualification Statement, with the modifications and additions as follows:
1. Add Paragraph 3.2.4: Submit a copy of all lawsuits to the City in duplicate.
 2. Revise Paragraph 3.4 to read: On a separate sheet, list all of your construction projects your organization has in progress, giving the name of the project, owner, owner's contact name and phone number, architect, architect's contact name and phone number, initial contract amount, change order costs to date, scheduled and anticipated completion dates and percentage of the work being performed with your own forces.
 3. Revise Paragraph 3.5 to read: On a separate sheet, list all of your municipal / institutional projects (over \$3,000,000) completed in the past five years, giving the name of the project, owner, owner's contact name and phone number, architect, architect's contact name and phone number, initial and final contract amounts, scheduled and actual completion dates and percentage of the work performed with your own forces. In addition to the municipal /

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GENERAL CONTRACTORS QUALIFICATIONS
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institutional projects listed, provide a list of other projects completed in the past five years; also include a total construction value completed per year.

4. Revise Paragraph 3.6 to read: Include resumes of specific personnel likely to be assigned to this project for the roles of: principal, project manager, project engineer and construction site superintendent. Provide relevant project experience of each individual as well as their current workloads (commitments for other projects). Provide a detailed description of their role for this project, include indications of time commitment (ie: full time, ½ time, etc.).
5. Add Paragraph 3.7: On a separate sheet, provide a description of your scheduling system and project management approach. Include the following information (as a minimum):

3.7 Scheduling / Project Management

- 3.7.1 Description of computer based scheduling program.
- 3.7.2 Type of reports generated (CPM, Bar chart, etc.).
- 3.7.3 Names and titles of individuals in firm proficient in its use.
- 3.7.4 Statement on how the system is used in house to support project management including: what reports are generated, who initiates reports, who receives reports, how reports are used, how reports are updated, frequency of updates, etc.
- 3.7.5 Provide a specific project management plan and milestone schedule for this project. Provide enough detail to convey your understanding of the project as well as how you will deliver a successful project.

6. Add Paragraph 3.8: Explain why your Company is best suited for this project.
7. Paragraph 4.2: Include Bank Officer contact name and telephone number.
8. Paragraph 4.3: Add the following sub paragraph:

4.3.3 Maximum bonding capacity.

- a. Maximum total value of contract work \$ _____.
- b. Maximum value for a single project \$ _____.

D. EVALUATION

1. Process. Firms submitting their bids and Contractor's Qualification Statement will be evaluated by the City of Warren as well as their Architect. The evaluation will be based on the information provided in the firm's submission as well as any other information the City or the Architect obtains concerning the firm's past performance. Oral interviews may be required to assist the City and Architect in their evaluation.

Firms which have submitted incomplete information may be provided an opportunity to correct any deficiencies which is at the sole discretion of the City. The City will notify the contractor in writing indicating the specific items which need to be addressed in order to be considered for this project.

2. The City expressly reserves the right to reject any and all bids, including the bid of any contractor that is not reasonably determined to be "responsible" in conjunction with the submitted information or the Responsibility Criteria outlined below. The City may consider the following information in determining whether a contractor is a Responsible Contractor. This is not intended to be an all-inclusive or exhaustive list.

RESPONSIBILITY CRITERIA

1. General information about the contractor's company, its principals, and its history, including state, date of formation and type of legal entity which the contractor utilizes to perform its business.
2. Evidence that the contractor and its employee(s) are appropriately licensed and are certified to perform the work that has been bid.
3. A confirmation that all subcontractors, employees and other individuals working on the Construction Project will maintain current applicable licenses and certifications with all appropriate licensing agencies including the Michigan Bureau of Construction Codes and Fire Safety, or any successor agency, and as may otherwise be required by law for all licensed occupations and professions.
4. The ratio of masters to journeypersons to apprentices proposed to be used on the Construction Project job site.
5. A description of any apprenticeship-training program maintained by the contractor.
6. Documentation that contractor has implemented a MIOSHA-approved safety/training program for employees used on the proposed job site.
7. A detailed description of the warranty statement covering labor and materials, which will be provided by the contractor if it is awarded the contract.
8. A list of any and all litigation or arbitrations involving the contractor within the past five (5) years, including an explanation of the circumstances surrounding the dispute, the remedy sought, and how the dispute was resolved or, if pending, the status of the litigation or arbitration.
9. Evidence of insurance, including certificates of insurance, confirming existence and amount of coverage for liability, property damage, workers compensation, and any other insurances required by the proposed contract documents, if it is awarded the contract.
10. References from individuals or entities that have received in the past five (5) years, or that are currently receiving, the contractor's services, including information regarding records of performance and job site cooperation.
11. A detailed description of any quality assurance program used by the contractor.
12. Evidence of the existence of a drug and alcohol program which will prevent all of the contractor's employees from entering City property under the influence of drugs or alcohol for each employee that will be working on the job site.
13. Evidence of the existence of a criminal records check procedure for each employee that will be working on the job site.
14. Any other relevant expertise, equipment, or ability of the contractor to perform the Construction Project, or relevant portion thereof.

END OF SECTION 003111

SECTION 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments provide the 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.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. Geotechnical investigation reports for the Project, prepared by G2 Consulting Group are available for viewing as appended to this Document,
 - 1. Fire Station #1: Refer to Geotechnical investigation Report, prepared by G2 Consulting Group Project # 220738, dated November 30, 2022. Refer to the following pages (25 pages total) for report.
 - a. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 2. Fire Station #5: A soils investigation and Geotechnical Investigation Report is being prepared by G2 Consulting Group for Fire Station #5. It will be made available and issued as part of an addendum when received.
- D. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.

END OF SECTION 003132



Report of Geotechnical Investigation

**City of Warren
Fire Station No. 1
23211 Van Dyke Avenue
Warren, Michigan 48089**

Latitude 42.46504 ° N
Longitude 83.02752 ° W

Prepared for:

City of Warren
One City Square, Suite 300
Warren, Michigan 48093

G2 Project No. 220738
November 30, 2022



November 30, 2022

Ms. Tina G. Gapshes, P.E.
City Engineer
City of Warren
One City Square, Suite 300
Warren, Michigan 48093

RE: Report of Geotechnical Investigation
City of Warren Fire Station No. 1
23211 Van Dyke Avenue
Warren, Michigan 48089
G2 Project No. 220738

Dear Ms. Gapshes,

We have completed the geotechnical investigation for the proposed fire station development to be constructed in The City of Warren, Michigan. This report presents the results of our observations and analyses and our recommendations for earthwork operations, foundation design, pavement design, and construction considerations as they relate to the geotechnical conditions on site.

We appreciate the opportunity to be of service to the City of Warren and look forward to discussing the recommendations presented. In the meantime, if you have any questions regarding the report or any other matter pertaining to this project, please call us.

Sincerely,

G2 Consulting Group, LLC

Charles SaintCyr, P.E.
Project Engineer

Amy L. Schneider, P.E.
Project Manager

CKS/ALS/ljv



EXECUTIVE SUMMARY

The proposed project includes the demolition of an existing single-story, slab-on-grade structure within the southeast corner of the property and construction of a new fire station building partially in the footprint of the demolished building. Associated pavements and utilities will be constructed in conjunction with the development.

Approximately 7 to 12 inches of topsoil are present at the ground surface of borings B-1, B-6, B-7, and B-9. Approximately 2 to 3 inches of bituminous concrete (asphalt) underlain by 6 to 12 inches of aggregate base are present at the ground surface of borings B-3, B-4, B-5, and B-8. Fill soils with trace organic matter, consisting of hard sandy clay and very loose to medium compact clayey sand and silty sand, underlie the topsoil and pavement section or extend from the ground surface at borings B-1 through B-3 and B-5 through B-9 and extend to depths ranging between 2 and 8 feet. Generally, native very stiff to hard silty clay and sandy clay underlie the fill soils and extend to the explored depths of 10 and 20 feet. However, medium to stiff silty clay is present within borings B-3 and B-5 from approximately 2 to 4 feet. No measurable groundwater was encountered during or upon completion of drilling operations at the boring locations.

At the start of earthwork operations, any site concrete, topsoil, vegetation, and associated root structures must be completely removed from the footprint of the proposed structure and pavement areas. The existing building, foundations, and floor slabs should also be removed in their entirety. Following demolition of the existing foundations, resulting excavations must be backfilled with engineered fill for support of foundations, floor slabs, and pavements. Foundation demolition and backfill operations must be observed by G2 Consulting Group, LLC (G2) to ensure proper preparation for support of the proposed building.

The existing fill within the vicinity of boring B-1 extends to an approximate depth of 8 feet and the fill within borings B-2, B-3, and B-5 extends to depths ranging from 2 to 4 feet. Additionally, the fill contains between 1 and 2.5 percent organic matter. These fill soils are not suitable for support of foundations. Based on the existing subsurface conditions and estimated building loads, we recommend the proposed building be supported on conventional strip and spread footings extending through the fill soils and native medium to stiff silty clay and bearing within the underlying native very stiff to hard cohesive soils. Typically, this will require foundations to extend to depths of up to 4 feet. However, within the vicinity of boring B-1, we anticipate foundations would need to extend approximately 8 feet below existing grade to encounter native soils. The over-excavated trenches can be backfilled with flowable fill or concrete. Alternatively, the existing fill could be removed within the foundation line and zone of influence in the vicinity of boring B-1 and the resulting excavation backfilled with Class II sand or MDOT 21AA limestone dense graded aggregate. Shallow foundations can be designed based on a net allowable bearing capacity of 2,500 pounds per square foot (psf) bearing on native very stiff to hard silty clay or Class II sand engineered fill overlying native very stiff to hard silty clay in demolished foundation excavations or unsuitable fill undercut excavations. Alternatively, foundations can be designed for a net allowable soil bearing capacity of 4,000 psf bearing on the native very stiff hard silty clay or MDOT 21AA limestone dense graded aggregate engineered fill within demolished foundation excavations or unsuitable fill undercut excavations.

Provided the risk of some floor slab settlement can be tolerated and provided the subgrade soils pass the proof compaction/proof-roll evaluation, we anticipate the existing fill may be suitable for support of the proposed building floor slabs following earthwork operations as described in the SITE PREPARATION section of this report. If the risk of floor slab settlement cannot be tolerated, the existing fill must be completely removed and replaced with engineered fill for the support of floor slabs.

Do not consider this summary separate from the entire text of this report, with all the conclusions and qualifications mentioned herein. Details of our analyses and recommendations are discussed in the following sections and in the Appendix of this report.



PROJECT DESCRIPTION

The proposed project includes the demolition of an existing structure within the southeast corner of the property and construction of a new fire station partially in the footprint of the demolished building. We anticipate the proposed fire station will be a slab-on-grade building. Associated pavements and utilities will be constructed in conjunction with the development. We estimate the parking lot and drive lanes will be constructed using heavy-duty Portland cement concrete.

The proposed finished floor elevation, existing site topography, and structural loading conditions were not available at the time of this report. We anticipate the proposed structure will have a finished floor elevation within 1-foot of the existing grades and foundation loads will be in the range of 50 and 100 kips at columns and between 2 and 4 kips per linear foot (klf) along walls. Once the finished floor elevation and structural loading conditions become available, G2 should be notified so we can review the recommendations provided herein.

SCOPE OF SERVICES

The field operations, laboratory testing, and engineering report preparation were performed under the direction and supervision of a licensed professional engineer. Our services were performed according to generally accepted standards and procedures in the practice of geotechnical engineering. Our scope of services for this project is as follows:

1. We drilled a total of nine soil borings within the property. Soil borings B-1 through B-5 were performed within the footprint of the proposed structure and extended to a depth of 20 feet each. Borings B-6 through B-9 were performed within the proposed pavement areas and extended to a depth of 10 feet each.
2. We performed laboratory testing on representative samples obtained from the soil borings. Laboratory testing included visual engineering classification, natural moisture content, organic matter content (loss-on-ignition), dry density, and unconfined compressive strength determination.
3. We prepared this engineering report. This report includes recommendations regarding the soil bearing capacity, estimated settlement, pavement design, and construction considerations related to the proposed development.

FIELD OPERATIONS

PARTNERS in Architecture, PLC, in conjunction with G2, selected the number, depth, and location of the soil borings. The soil boring locations were determined in the field by use of GPS assisted mobile technology prior to drilling operations and were located to avoid potential utility conflicts. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate No. 1. Ground surface elevations were not available at the time of this report.

The soil borings were drilled using a truck-mounted rotary drilling rig. Continuous flight 2-1/4 inch inside diameter, hollow-stem augers were used to advance the boreholes to the explored depths. In each soil boring, soil samples were obtained at intervals of 2-1/2 feet within the upper 10 feet and at 5-foot intervals thereafter. The samples were obtained by the Standard Penetration Test method ASTM D 1586, which involves driving a 2-inch diameter split-spoon sampler into the soil with a 140-pound weight falling 30 inches. The sampler is driven three successive 6-inch increments with the number of blows for each increment recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). Blow counts for each 6-inch increment and the resulting N-value are presented on the individual soil boring logs.

Soil samples were placed in sealed containers in the field and brought to the laboratory for testing and classification. During drilling operations, the drilling crew maintained logs of encountered subsurface conditions, including changes in stratigraphy and observed groundwater levels of the soil borings to be

used in conjunction with our analysis of the subsurface conditions. The final boring logs are based on the field logs and laboratory soil classification and test results. After completion of the drilling operations, the boreholes were backfilled with the auger cuttings and topped with asphaltic cold patch where necessary.

LABORATORY TESTING

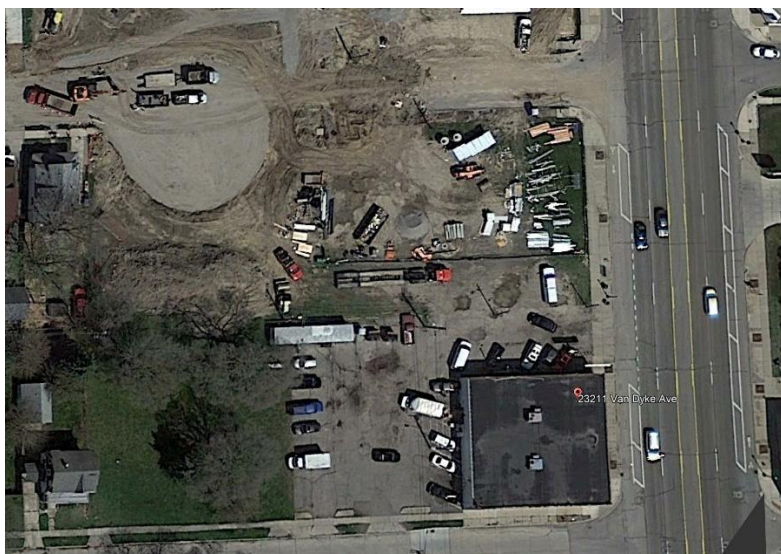
Representative soil samples were subjected to laboratory testing to determine soil parameters pertinent to foundation design and site preparation. An experienced geotechnical engineer classified the soils in general conformance with the Unified Soil Classification System.

Laboratory testing included natural moisture content, organic matter contents (loss-on-ignition), dry density, and unconfined compressive strength determination. The organic matter content of representative samples was determined in accordance with ASTM Test Method D 2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils". The unconfined compressive strengths were determined by ASTM Test Method D2166 and using a spring-loaded hand penetrometer. Per ASTM Test Method D2166, the unconfined compressive strength of cohesive soils is determined by axially loading a small cylindrical soil sample under a slow rate of strain. The unconfined compressive strength is defined as the maximum stress applied to the soil sample before shear failure. If shear failure does not occur prior to a total strain of fifteen percent, the unconfined compressive strength is defined as the stress at a strain of fifteen percent. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring-loaded cylinder.

The results of the laboratory tests are indicated on the soil boring logs, Figure Nos. 1 through 9, at the depths the samples were obtained. The Unconfined Compressive Strength Tests are also shown graphically on Figure No. 10 in the Appendix. We will hold the soil samples for 60 days from the date of this report, after which time they will be discarded. If you would like the samples, please let us know.

SITE DESCRIPTION

The development is located at the northwest corner of the intersection of Continental Avenue and Van Dyke Avenue in the City of Warren, Michigan. An existing building to be demolished and surrounding bituminous pavements are present within the southeast corner of the property. The remaining grade is generally grass covered with a few mature trees.



GOOGLE EARTH IMAGE - 2019



Historical images from Google Earth seen above indicate disturbance of the property occurred during construction of the library and police station building north of the property. Based on visual observations, grades are relatively flat across the development. Beyond the development limits, the surrounding properties are residential and commercial in nature.

SUBSURFACE CONDITIONS

Approximately 7 to 12 inches of topsoil are present at the ground surface of borings B-1, B-6, B-7, and B-9. Approximately 2 to 3 inches of bituminous concrete underlain by 6 to 12 inches of aggregate base are present at the ground surface of borings B-3, B-4, B-5, and B-8. Fill soils, consisting of sandy clay, clayey sand, and silty sand with trace organic matter, underlie the topsoil and pavement section at borings B-1 through B-3 and B-5 through B-9 and extend to depths ranging between 2 and 8 feet. Native silty clay and sandy clay underlie the fill soils and extend to the explored depths of 10 and 20 feet.

The sandy clay fill is stiff to hard in consistency with moisture contents ranging from 9 to 14 percent, organic matter contents of 1 to 2.5 percent and unconfined compressive strengths ranging from 3,370 to 9,000 psf. The clayey sand fill and silty sand fill are very loose to medium compact with Standard Penetration Test (SPT) N-values ranging from 3 to 28 blows per foot of penetration (bpf) and an organic matter content of 3.1 percent. The native cohesive soils are generally very stiff to hard in consistency with natural moisture contents between 10 and 23 percent and unconfined compressive strengths ranging from 6,000 to 9,000 psf. However, the silty clay within B-3 and B-5 present below the fill and extending to an approximate depth of 4 feet is medium to stiff in consistency with natural moisture contents of 13 and 29 percent and unconfined compressive strengths of 2,000 and 2,770 psf.

The stratification depths shown on the soil boring logs represent the soil conditions at the boring locations. Variations may occur away from the boring locations. Additionally, the stratigraphic lines represent the approximate boundary between soil types. The transition may be more gradual than what is shown. We have prepared the boring logs on the basis of the field logs of soils encountered supplemented by laboratory classification and testing.

The Soil Boring Location Plan, Plate No. 1, Soil Boring Logs, Figure Nos. 1 through 9, and Unconfined Compressive Strength Test, Figure No. 10, are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes Terminology defining the nomenclature used on the boring logs and elsewhere in this report is presented on Figure No. 11.

GROUNDWATER CONDITIONS

No measurable groundwater was encountered during or upon completion of drilling operations. Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation. It should also be noted that groundwater observations made during drilling operations in predominantly cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow.

EARTHWORK

Based on the existing conditions, we anticipate a moderate amount earthwork will be required to develop the site. We anticipate the earthwork operations to consist of demolition of the existing building, associated foundations, and utilities, removing any existing site concrete, bituminous pavement, topsoil, vegetation, and associated root structures within the proposed building footprint and pavements, proof-compacting/proof rolling the exposed subgrade, undercutting unsuitable soils, excavating for utilities and foundations, and preparing the site for floor slab and pavement support. We



recommend all earthwork operations be performed in accordance with comprehensive specifications and be properly monitored in the field by qualified personnel under the direction of a licensed professional engineer.

At the start of earthwork operations, any site concrete, topsoil, vegetation, and associated root structure must be completely removed from the footprint of the proposed structure and pavement areas. The existing building, foundations, and floor slabs should also be removed in their entirety. Following demolition of the existing foundations, resulting excavations must be backfilled with engineered fill for support of foundations, floor slabs, and pavements. The type of engineered fill will be dictated by the structural engineer and specified design bearing capacity. Foundation demolition and backfill operations must be observed by G2 to ensure proper preparation for support of the proposed building.

Any existing utilities and associated backfill located within the proposed structure footprint should be completely removed and backfilled with engineered fill. Where utilities lie outside the proposed structure zone of influence, utilities to be abandoned can be backfilled with grout and left in place. The zone of foundation influence may be defined as the prism of soil beneath the building foundation and below a 1H:2V inclined plane extending downward and laterally beyond the foundation edges.

Following the removal of the existing structure, foundations, and pavements and prior to the placement of engineered fill the exposed subgrade in the proposed building and pavement areas should be thoroughly proof compacted/proof rolled and monitored by a qualified geotechnical engineer. For areas of cohesive soils, the subgrade should be proof rolled with a fully loaded tri-axle dump truck. For areas of granular soils, the exposed subgrade should be proof compacted with a vibratory roller making a minimum of 10 passes in two perpendicular directions. Any unstable or unsuitable areas noted should be improved by compaction or removed and replaced with engineered fill. Any soils that are disturbed during grading operations or during removal of existing structures should be removed and replaced with engineered fill.

The on-site fill soils cannot be reused as engineered fill due to the presence of organic matter and miscellaneous debris. Engineered fill should be free of organic matter, frozen soil, clods, or other harmful material. The fill should be placed in uniform horizontal layers, not more than 9 inches in loose thickness. The engineered fill should be compacted to achieve a density of at least 95 percent of the maximum dry density as determined by the Modified Proctor compaction test (ASTM D 1557). All engineered fill material should be placed and compacted at approximately the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade. Any granular engineered fill should be compacted within 2 percent of optimum moisture content. Cohesive engineered fill should be placed within 3 percent above and 1 percent below the optimum moisture content determined by a Modified Proctor.

We recommend the use of granular engineered fill within confined areas such as utility trenches and adjacent to foundations and catch basins. Granular engineered fill is generally more easily compacted than cohesive soils within these confined areas. Additionally, the proper placement and compaction of backfill within these areas is imperative to provide adequate support for overlying floor slabs.

FOUNDATION RECOMMENDATIONS

The existing fill within the vicinity of boring B-1 extends to an approximate depth of 8 feet and the fill within borings B-2, B-3, and B-5 extends to depths ranging from 2 to 4 feet. Additionally, the fill contains between 1 and 2.5 percent organic matter. These fill soils are not suitable for support of foundations. Based on the existing subsurface conditions and estimated building loads, we recommend the proposed building be supported on conventional strip and spread footings extending through the fill soil and medium to stiff silty clay to bear within the underlying native very stiff to hard cohesive soils. Typically, this will require foundations to extend to depths of up to 4 feet. However, within the vicinity of boring B-1, we anticipate foundations would need to extend approximately 8 feet below existing grade to encounter native soils.

The over-excavated trenches can be backfilled with flowable fill as depicted below in Figure Nos. 1 and 2. The flowable fill excavation needs to extend laterally at least three inches beyond the perimeter edge of the foundation. Flowable fill with a minimum unconfined compressive strength of 150 pounds per cubic inch (pci) will adequately transfer foundation loads to the native very stiff to hard bearing soils. Alternatively, excavations can be backfilled with concrete the entire depth; however, the structural engineer should provide reinforcing steel recommendations for these conditions.

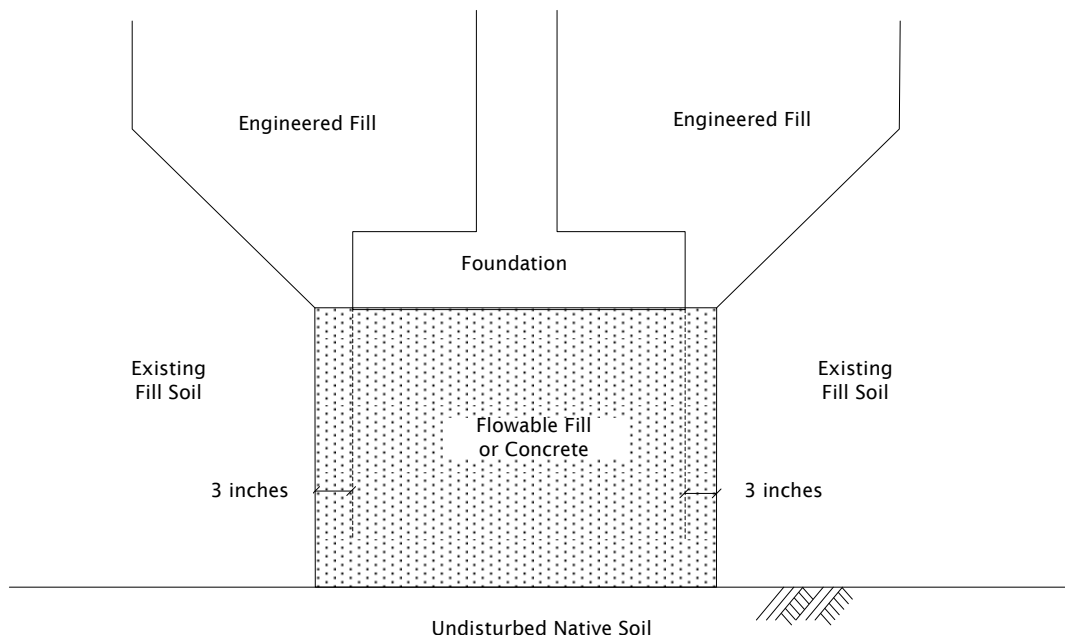


Figure 1 – Spread Foundation

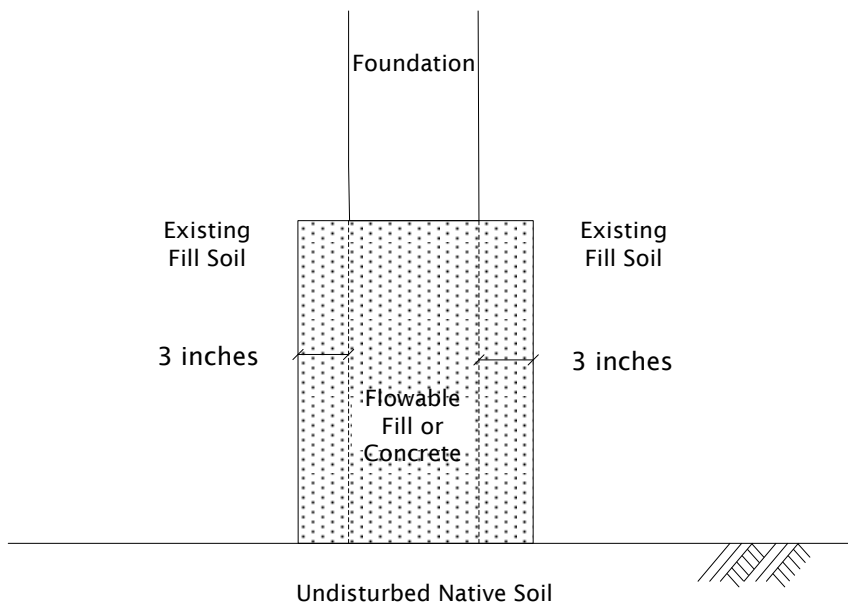


Figure 2 – Strip Foundation

The existing fill could also be removed within the foundation line and zone of influence in the vicinity of boring B-1 and the resulting excavation backfilled with Class II sand or MDOT 21AA limestone dense

graded aggregate. Foundation undercuts are expected to extend to depths of up to 8 feet in the vicinity of boring B-1. Foundation undercuts should be performed as illustrated in Figure 3 below.

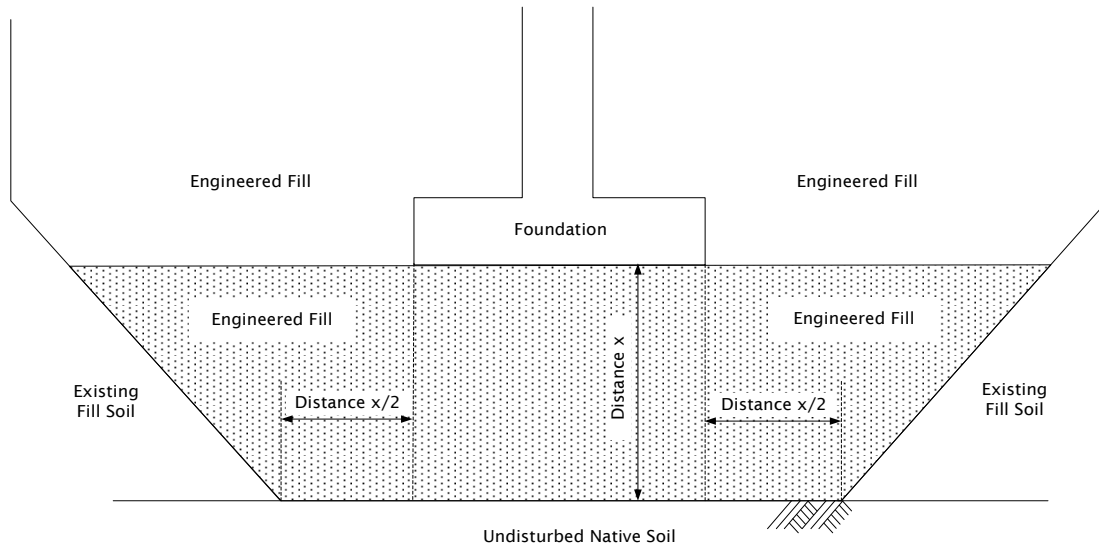


Figure 3

Shallow foundations can be designed based on a net allowable bearing capacity of 2,500 psf bearing on Class II sand engineered fill overlying very stiff to hard silty clay in demolished foundation excavations or unsuitable fill undercut excavations. Alternatively, a net allowable soil bearing capacity of 4,000 psf can be utilized for foundation design bearing on the native very stiff hard silty clay or MDOT 21AA limestone dense graded aggregate engineered fill within demolished foundation excavations or unsuitable fill undercut excavations.

Regardless of the option chosen, exterior footings should bear at a minimum depth of 3-1/2 feet below finished grade for protection against frost heave. Interior foundations can bear at shallower depths provided native soils or suitable engineered fill overlying native soils are present and foundations are protected from frost during construction. We recommend a G2 engineer be on site during construction to observe the excavations, measure the bearing depths, and verify the adequacy of the native bearing soils.

Continuous wall or strip footing foundations should be at least 12 inches in width and isolated spread footing foundations should be at least 30 inches in their least dimension. To achieve a change in the level of a strip footing, the foundation should be gradually stepped at a grade no steeper than two units horizontal to one unit vertical (2H:1V).

If the recommendations outlined in this report are adhered to, total and differential settlements for the completed structure should be within 1 inch and 1/2 inch, respectively. We expect settlements of these magnitudes are within tolerable limits for the type of structure proposed. We recommend all foundations be suitable reinforced to minimize the effects of differential settlements associated with local variations in subsoil conditions.

FLOOR SLAB RECOMMENDATIONS

Provided the risk of some floor slab settlement can be tolerated and provided the subgrade soils pass the proof compaction/proof-roll evaluation, we anticipate the existing fill may be suitable for support of the proposed building floor slabs following earthwork operations as described in the SITE PREPARATION section of this report. Floor slabs supported by these soils may be designed using a subgrade modulus of up to 100 pounds per cubic inch (pci).



If the risk of floor slab settlement cannot be tolerated, the existing fill must be completely removed and replaced with engineered fill for the support of floor slabs. Floor slabs supported on native soils and/or engineered fill can be designed for a subgrade modulus of 150 pci.

We recommend at least 4 inches of pea gravel/clean coarse gravel be placed between the subgrade and the bottom of the floor slab for use as a capillary break to reduce moisture transmission through the concrete floors and to reduce the potential for concrete curling. If moisture sensitive floor coverings are planned, or if greater protection against vapor transmission is desired, a vapor barrier, consisting of at least 10-mil plastic sheeting, may be placed over the capillary break layer beneath floor slabs. We recommend all concrete floor slabs be suitably reinforced and separated from the foundation system to allow for independent movement.

PAVEMENT RECOMMENDATIONS

Information related to the proposed pavement sections and traffic conditions was not available to us at the time of this report. We anticipate light-duty and heavy-duty bituminous and Portland cement concrete pavements will be constructed in conjunction with the proposed development. We anticipate the subgrade soils at or near proposed finished grades will generally be suitable for support of the proposed pavements provided subgrade preparation is performed as outlined in the SITE PREPARTION section of this report. However, based on the presence of fill and organic matter, we recommend a budget be allocated for undercuts, potentially on the order of 20 to 30 percent.

We anticipate the majority of traffic will be passenger vehicles with several delivery trucks, garbage trucks, and fire trucks. For a design life of 20 years, we estimate these light-duty areas may result in approximately 75,000 equivalent 18-kip single-axle loads (ESALs) for the pavements. We estimate an average of 8 passes per day of firetrucks within the heavy-duty concrete pavement areas. Based on this frequency over a 30-year design life (typical of concrete pavements), we estimate these heavy-duty areas may result in approximately 265,000 equivalent 18-kip single-axle loads (ESALs). We performed pavement design analysis in accordance with the “AASHTO Guide for Design of Pavement Structures.”

Based on the existing variable fill soils, we recommend the subgrade soils be assigned an effective roadbed soil resilient modulus of 7,000 psi for use in pavement design. For evaluation purposes, we estimated a serviceability loss of 2.0, a reliability factor of 0.95, and a standard deviation of 0.49 for flexible pavement design and 0.39 for rigid pavement design. Based on the results of our analysis, we recommend the following minimum pavement design cross sections:

Typical Light-Duty Flexible Pavement Section		
Material	Thickness	Structural Coefficient
MDOT 5EML Bituminous Wearing Course	2 inches	0.42
MDOT 4EML Bituminous Leveling Course	2 inches	0.42
MDOT 21AA Aggregate Base Course (dense-graded)	8 inches	0.14

Typical Heavy-Duty Flexible Pavement Section		
Material	Thickness	Structural Coefficient
MDOT 5EML Bituminous Wearing Course	2 inches	0.42
MDOT 4EML Bituminous Leveling Course	3 inches	0.42
MDOT 21AA Aggregate Base Course (dense-graded)	10 inches	0.14



Rigid Pavement Section	
Material	Thickness
Portland Cement Concrete	8 inches
MDOT 21AA Aggregate Base Course (dense-graded)	6 inches

Large front-loading refuse trucks can impose significant concentrated wheel loads within trash dumpster pick-up areas. This type of loading can result in rutting of asphalt pavements and ultimately in failure. Therefore, we recommend concrete pavement be used in these areas. The concrete pad should be large enough to support the entire refuse truck during pick-up operations. Reinforcement for the concrete slabs can consist of load-transfer dowels at the joints.

Proper drainage is considered to be an important consideration for pavement design. In consideration of the predominantly cohesive subgrade soils, we recommend “stub” or “finger” drains be provided around catch basins and other low parts of the site to minimize the accumulation of water above and within any frost susceptible subgrade soils. Consideration should also be given to providing subdrains around the perimeter of the parking area since it can become a source of water infiltration into the pavement. Such subdrains could be connected to nearby catch basins. The pavement and subgrade should be properly sloped to promote effective surface and subsurface drainage and prevent water ponding.

We recommend regular timely maintenance be performed on the pavement to reduce the potential deterioration associated with moisture infiltration through surface cracks. The owner should be prepared to seal the cracks with a hot-applied elastic crack filler as soon as possible after cracking develops and as often as necessary to block the passage of water to the subgrade soils. We recommend that crack sealing be performed on a yearly basis for pavements that are in good and fair condition to extend the life of the pavements.

CONSTRUCTION CONSIDERATIONS

Caving and/or sloughing of the granular fill soils may occur during foundation excavation operations. Therefore, the contractor should be prepared to over excavate and form foundations, as necessary, within the existing granular fill or granular engineered fill soils. The sides of the spread and/or strip footing foundations should be constructed straight and vertical to reduce the risk of frozen soil adhering to the concrete and raising the foundations.

In general, we do not anticipate significant accumulations of groundwater within construction excavations at the depths anticipated for this project. We anticipate any surface run off should be controllable with normal pumping from properly constructed sumps.

Where excavations extend deeper than 5 feet and sufficient space is available, we recommend maximum slopes of 3/4H:1V within the very stiff to hard cohesive soils and 2H:1V within the very loose to medium compact granular soils and medium to stiff cohesive soils. All excavations should be safely sheeted, shored, sloped, or braced in accordance with MIOSHA requirements. If material is stored or equipment is operated near an excavation, lower angle slopes or stronger shoring must be used to resist the extra pressure due to the superimposed loads.

GENERAL COMMENTS

We have formulated the evaluations and recommendations presented in this report relative to site preparation and foundations on the basis of data provided to us relating to the project location, type of structure, and surface grade for the proposed site. If changes occur in the design, location, or concept of the project, conclusions and recommendations contained in this report are not valid unless G2 Consulting Group, LLC reviews the changes. G2 Consulting Group, LLC will then confirm the recommendations presented herein or make changes in writing.



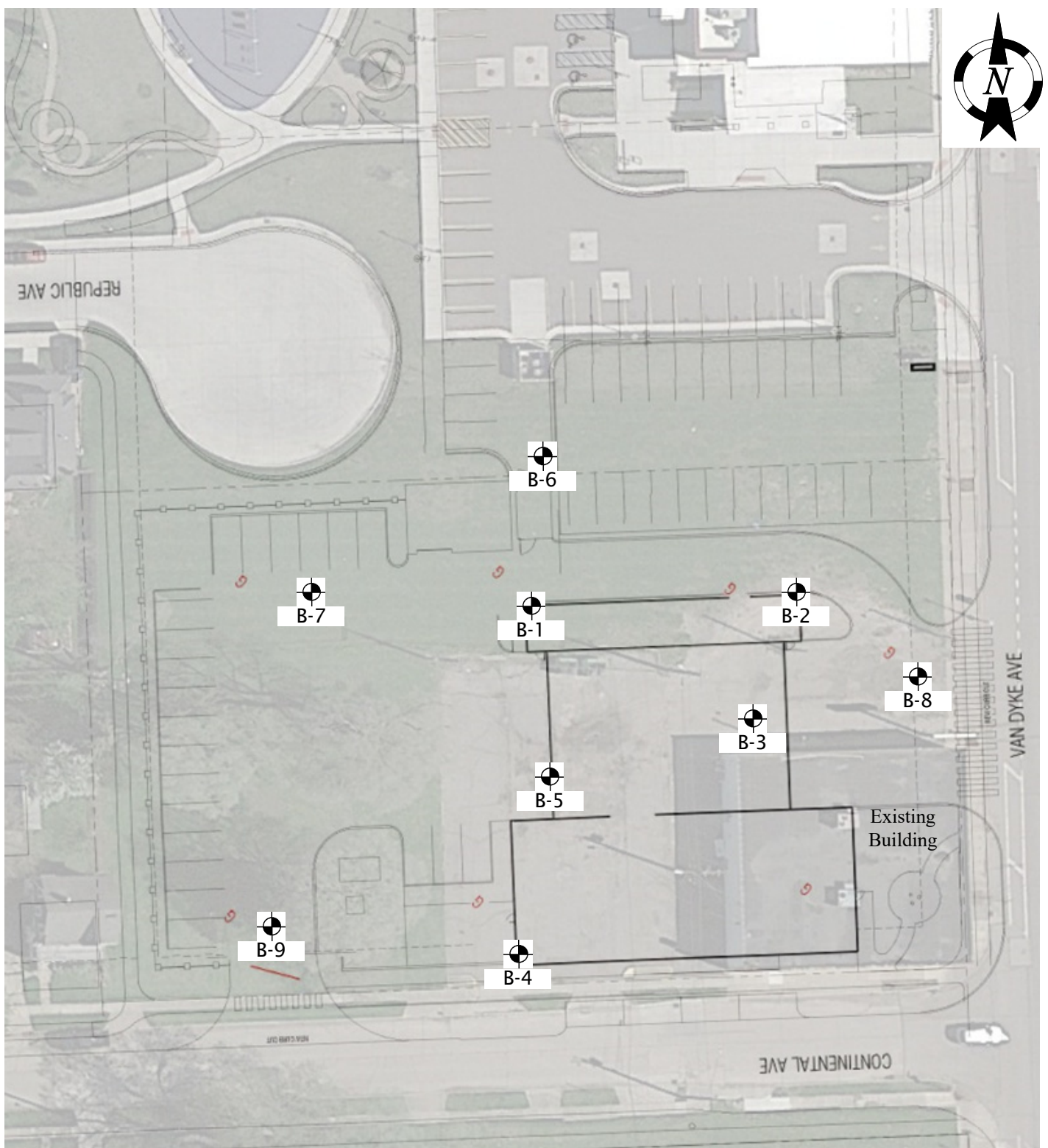
The scope of the present investigation was limited to evaluation of subsurface conditions for the support of proposed building and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation.

We base the analyses and recommendations submitted in this report upon the data from the soil borings performed at the approximate locations shown on the Soil Boring Location Plan, Plate No. 1. This report does not reflect variations that may occur between the actual boring locations and the actual structure locations. The nature and extent of any such variations may not become clear until the time of construction.


If significant variations then become evident, it may be necessary for us to re-evaluate our report recommendations. We recommend a qualified geotechnical engineering firm observe all geotechnical related work, including subgrade preparation and engineered fill placement. The consulting firm will perform the appropriate testing to confirm the geotechnical conditions given in the report are found during construction.

APPENDIX

Soil Boring Location Plan	Plate No. 1
Soil Boring Logs	Figure Nos. 1 through 9
Unconfined Compressive Strength Test	Figure No. 10
General Notes Terminology	Figure No. 11



Legend

 Soil Borings Drilled by G2 Consulting Group, LLC on November 7, 2022.

Soil Boring Location Plan

City of Warren Fire Station No. 1
23211 Van Dyke Avenue
Warren, Michigan 48089



Project No. 220738

Drawn by: CKS

Date: 11/22/22

Scale: NTS

Plate
No. 1

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-1**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (9 inches)	0.8						
		Fill: Hard Gray Sandy Clay with trace silt, gravel, organic matter and debris (Organic Matter Content = 1.0%)	3.0	S-1	8 10 9	19			9000*
		Fill: Loose Dark Brown Silty Sand	4.0						
5		Fill: Stiff Mottled Brown and Gray Sandy Clay with trace gravel, occasional sand seams	5	S-2	3 3 3	6	13.5	113	3370
		Fill: Very Loose Gray Clayey Silt with trace gravel and organic matter	7.0						
			8.0	S-3	2 1 2	3			4000*
10		Hard Brown Silty Clay with trace sand and gravel	10	S-4	5 10 16	26	10.7		9000*
			13.0						
15		Hard Gray Silty Clay with trace sand and gravel	15	S-5	6 7 10	17	11.8		9000*
			20.0						
20		End of Boring @ 20 ft	20	S-6	6 7 9	16	11.8		9000*
25			25						

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Total Depth: 20 ft
Drilling Date: November 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: C. Nicol

Water Level Observation:
Dry during and upon completion of drilling

Notes:
Borehole collapsed at 13 ft after auger removal
* Calibrated Hand Penetrometer

Drilling Method:
2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 1

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-2**
CONSULTING GROUP

SUBSURFACE PROFILE			SOIL SAMPLE DATA								
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)		
		Fill: Hard Black and Brown Sandy Clay with trace silt, gravel, organic matter, and debris (Organic Matter Content = 2.5%)			13 11 8	19			9000*		
5			4.0	S-1	7 4 7	11	14.2		7000*		
			Very Stiff Mottled Brown and Gray Sandy Clay with trace silt and gravel			6 8 14	22	10.8		9000*	
				6.0	S-3	6 12 18	30	12.1		9000*	
10				Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	10	S-4	5 7 14	21	11.5		9000*
			Hard Gray Silty Clay with trace silt and gravel			5 5 9	14	12.7		9000*	
15	13.0	S-5									
20		End of Boring @ 20 ft	20	S-6							
25			25								

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Total Depth: 20 ft
Drilling Date: November 7, 2022
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: C. Nicol

Water Level Observation:
Dry during and upon completion of drilling

Notes:
Borehole collapsed at 14 ft after auger removal
* Calibrated Hand Penetrometer

Drilling Method:
2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 2

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-3**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (2-1/2 inches)	0.2						
		Aggregate Base: Sand and Gravel (7 inches)	0.8						
		Fill: Very Loose Brown Clayey Sand with trace debris	2.0	S-1	1 1 2	3	13.4		2000*
		Medium to Stiff Mottled Brown and Gray Silty Clay with trace sand and gravel	4.0	S-2	3 3 6	9	22.9		9000*
5			5	S-3	5 6 12	18	12.8		9000*
		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel		S-4	4 8 9	17	17.8		9000*
10			10						
			13.0						
15			15	S-5	4 5 9	14	12.2		9000*
		Hard Gray Silty Clay with trace sand and gravel							
			20.0	S-6	3 3 6	9	13.4		9000*
20		End of Boring @ 20 ft	20						
25			25						

Total Depth: 20 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 15-1/2 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings and cold patch

Figure No. 3

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-4**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (3 inches)	0.3						
		Fill: Brown and Black Sandy Gravel (12 inches)	1.5						
5		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-1	3 3 6	9	11.7		9000*
			5.5	S-2	4 6 8	14	15.8		9000*
10		Hard Brown Silty Clay with trace sand and gravel, occasional sand partings	10	S-3	4 6 11	17	15.2		9000*
			12.0	S-4	3 9 15	24	10.9		9000*
15		Hard Gray Silty Clay with trace sand and gravel	15	S-5	3 5 9	14	11.7		9000*
			20.0	S-6	3 5 8	13	13.1		9000*
20		End of Boring @ 20 ft	20						
25			25						

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Total Depth: 20 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 15-1/2 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings and cold patch

Figure No. 4

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-5**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (3 inches)	0.3						
		Aggregate Base: Sand and Gravel (6 inches)	0.8						
		Fill: Very Loose Black Clayey Sand	2.0		2				
				S-1	1	4	28.5	100	2770
					3				
5		Stiff to Very Stiff Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	3	8	18.3		6000*
					3				
			5.5						
				S-3	4				
					10	27	12.3		9000*
					17				
10		Hard Brown Silty Clay with trace sand and gravel	10	S-4	5	30	11.9		9000*
					12				
					18				
			13.0						
15		Hard Gray Silty Clay with trace sand and gravel	15	S-5	3	14	13.9		9000*
					6				
					8				
			20.0						
20		End of Boring @ 20 ft	20	S-6	3	13	12.9		9000*
					5				
					8				
25			25						

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Total Depth: 20 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 15 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings and cold patch

Figure No. 5

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-6**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (12 inches)	1.0						
		Fill: Medium Compact Brown Silty Sand with trace gravel	3.5	S-1	5 7 5	12			
5		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	3 3 4	7	23.3		8000*
		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	8.0	S-3	3 7 10	17	11.5		9000*
10		Hard Brown Silty Clay with trace sand and gravel	10.0	S-4	5 10 14	24	10.0		9000*
		End of Boring @ 10 ft							
15			15						
20			20						
25			25						

Total Depth: 10 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 5 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Figure No. 6

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-7**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (8 inches)	0.8						
		Fill: Medium Compact Brown and Black Clayey Sand with trace silt, gravel, organic matter, and concrete debris (Organic Matter Content = 3.1%)	3.5	S-1	5 10 5	15			
5		Stiff to Very Stiff Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	2 2 2	4	17.2		6000*
				S-3	1 2 2	4	22.0		3000*
10		Hard Brown Silty Clay with trace sand and gravel	10.0	S-4	8 11 15	26	10.2		9000*
		End of Boring @ 10 ft							
15			15						
20			20						
25			25						

Total Depth: 10 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 2-1/2 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings

Figure No. 7

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-8**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (2 inches)	0.2						
		Aggregate Base: Sand and Gravel (8 inches)	0.8						
		Fill: Medium Compact Black and Brown Clayey Sand with trace silt, gravel, and debris	3.0	S-1	5 17 11	28			
5		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	4 3 5	8	23.0		9000*
				S-3	5 8 11	19	11.4		9000*
10				S-4	5 11 13	24	11.5		9000*
		End of Boring @ 10 ft	10.0						
15			15						
20			20						
25			25						

Total Depth: 10 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

Notes:
 Borehole collapsed at 5-1/2 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings and cold patch

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Figure No. 8

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No. 220738

Latitude: N/A Longitude: N/A



Soil Boring No. **B-9**
CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (7 inches)	0.6						
		Fill: Loose Black and Brown Silty Sand with trace silt, gravel, organic matter, and debris (Organic Matter Content = 3.2%)	4.0	S-1	12 5 3	8			
5		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	5.5	S-2	5 5 4	9	14.3		9000*
		Hard Brown Silty Clay with trace sand and gravel		S-3	8 11 9	20	12.8		9000*
10			10.0	S-4	5 8 7	15	16.6		9000*
		End of Boring @ 10 ft							
15			15						
20			20						
25			25						

Total Depth: 10 ft
 Drilling Date: November 7, 2022
 Inspector:
 Contractor: G2 Consulting Group, LLC
 Driller: C. Nicol

Water Level Observation:
 Dry during and upon completion of drilling

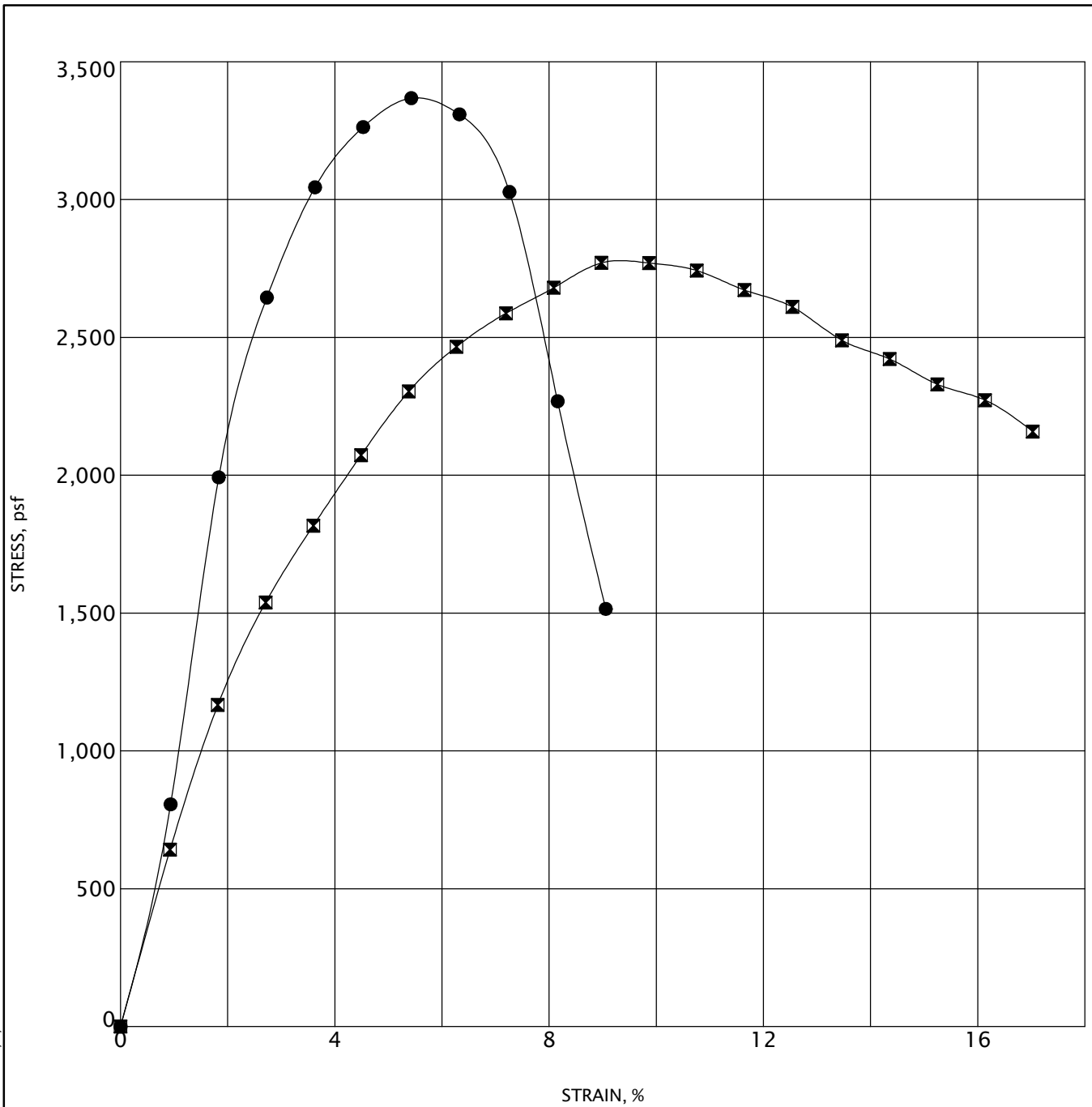
Notes:
 Borehole collapsed at 5 ft after auger removal
 * Calibrated Hand Penetrometer

Drilling Method:
 2-1/4 inch inside diameter hollow stem augers

Excavation Backfilling Procedure:
 Auger cuttings

SOIL / PAVEMENT BORING 220738.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 12/5/22

Figure No. 9



Specimen	Classification	MC%	γ_d	UC
● B-1 S-2	Brown and Gray Sandy Clay	14	113	3370
☒ B-5 S-1	Brown and Gray Silty Clay	28	100	2770

UNCONFINED COMPRESSIVE STRENGTH TEST

Project Name: City of Warren Fire Station No. 1

Project Location: 23211 Van Dyke Avenue
Warren, Michigan 48089

G2 Project No.: 220738

Figure No. 10



GENERAL NOTES TERMINOLOGY

Unless otherwise noted, all terms herein refer to the Standard Definitions presented in ASTM 653.

PARTICLE SIZE

Boulders	- greater than 12 inches
Cobbles	- 3 inches to 12 inches
Gravel - Coarse	- 3/4 inches to 3 inches
- Fine	- No. 4 to 3/4 inches
Sand - Coarse	- No. 10 to No. 4
- Medium	- No. 40 to No. 10
- Fine	- No. 200 to No. 40
Silt	- 0.005mm to 0.074mm
Clay	- Less than 0.005mm

CLASSIFICATION

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituent (percent by weight)
Trace - 1 to 12%	Trace - 1 to 12%
Adjective - 12 to 35%	Little - 12 to 23%
And - over 35%	Some - 23 to 33%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e. sandy clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e. silty clay, trace sand, little gravel.

Consistency	Unconfined Compressive Strength (psf)	Approximate Range of (N)
Very Soft	Below 500	0 - 2
Soft	500 - 1,000	3 - 4
Medium	1,000 - 2,000	5 - 8
Stiff	2,000 - 4,000	9 - 15
Very Stiff	4,000 - 8,000	16 - 30
Hard	8,000 - 16,000	31 - 50
Very Hard	Over 16,000	Over 50

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

Density Classification	COHESIONLESS SOILS Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

Relative Density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

- AS - Auger Sample - Cuttings directly from auger flight
- BS - Bottle or Bag Samples
- S - Split Spoon Sample - ASTM D 1586
- LS - Liner Sample with liner insert 3 inches in length
- ST - Shelby Tube sample - 3 inch diameter unless otherwise noted
- PS - Piston Sample - 3 inch diameter unless otherwise noted
- RC - Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D 1586) - A 2.0 inch outside-diameter, 1-3/8 inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

SECTION 004313 - BID SECURITY FORMS

1.1 BID FORM SUPPLEMENT

- A. A completed bid bond form is required to be attached to the Bid Form.
 - 1. A certified check is also an acceptable means of providing the required bid security. Certified check must be payable to the "City of Warren".

1.2 BID BOND FORM

- A. AIA Document A310, "Bid Bond," is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement.
- B. Copies of AIA standard forms may be obtained from The American Institute of Architects; www.aia.org/contractdocs/purchase/index.htm; email: docspurchases@aia.org; (800) 942-7732.

END OF SECTION 004313

SECTION 004373 - PROPOSED SCHEDULE OF VALUES FORM

1.1 POST BID SUPPLEMENT

- A. A completed Proposed Schedule of Values form is required to be provided, upon request from Architect after bid has been submitted.

1.2 PROPOSED SCHEDULE OF VALUES FORM

- A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, 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.
 - 1. Upon award of contract, Contractor to identify "labor" and "material" costs for each line item on the schedule of values.
 - 2. Refer to Specification Section 012900 for additional schedule of values requirements.
- B. Arrange schedule of values consistent with format of AIA Document G703.
 - 1. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.

END OF SECTION 004373

SECTION 006000 - 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. Owner / Contractor Agreement: City of Warren Format.
 - a. Copy of agreement is included in Project Manual.
 - 2. General Conditions:
 - a. City of Warren General Conditions. Refer to Section 000100 for copy.
 - b. AIA Document A201-2017. Copy of A201-2017 is included in Project Manual.
 - c. Supplementary General Conditions. Refer to Section 008000 for copy.

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; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.
- C. Preconstruction Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
 - 2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."
- D. Information and Modification Forms:
 - 1. Form of Request for Proposal: AIA Document G709, "Work Changes Proposal Request."
 - 2. Change Order Form: AIA Document G701, "Change Order."
 - 3. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."
 - 4. Form of Change Directive: AIA Document G714, "Construction Change Directive."
- E. Payment Forms:
 - 1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."
 - 2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
 - 3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
 - 5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

END OF SECTION 006000



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Warren New Fire Station #1 and #5 PIA #21-146A/B

THE OWNER:

(Name, legal status and address)

City of Warren
One City Square, 4th Floor
Warren, MI 48093-5289

THE ARCHITECT:

(Name, legal status and address)

PARTNERS in Architecture, PLC
65 Market Street
Mount Clemens, MI 48043

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- 13 MISCELLANEOUS PROVISIONS

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.

Init.

User Notes:

(1933797684)

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

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User Notes:

(1933797684)

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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.

§ 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 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

§ 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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

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

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. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

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

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

§ 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 substantial breach of a provision of the Contract Documents.

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

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 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.



SECTION 008000 - SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction", AIA Document A201/2017 Edition. Where any Article of the General Conditions is modified or any 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.

SUPPLEMENTARY CONDITIONS

ARTICLE 16 MODIFICATIONS TO THE GENERAL CONDITIONS

16.1 Modification of ARTICLE 1 GENERAL PROVISIONS

16.1.1 Modification of Paragraph 1.1 BASIC DEFINITIONS

16.1.1.3 Add to Subparagraph 1.1.3:

The definition of 'Work' shall also include labor, materials, equipment and services provided or to be provided by subcontractors, sub-subcontractors, material suppliers or any other entity for whom the Contractor is responsible under or pursuant to the Contract Documents.

16.2 Modification of ARTICLE 2 OWNER

16.2.3 Modification of Paragraph 2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

16.2.3.4 Add to Subparagraph 2.3.4:

However, Contractor shall notify Owner of any errors, problems or inaccuracies which it becomes aware of in the course of its use of such surveys.

16.2.5 Modification of Paragraph 2.5 OWNER'S RIGHT TO CARRY OUT THE WORK

16.2.5.1 Add Subparagraph 2.5.1:

2.5.1 The Contractor agrees that the Owner, by mutual agreement with the Contractor, shall have the right to place and install equipment and machinery during the progress of the Work before the completion of the various parts of the Work; and further agrees that such placing and installation of equipment shall not in any way effect the completion of the Work or any portion thereof, nor signify the Owner's acceptance of the Work or any portion thereof. Should the Owner place or install such equipment and machinery with its own forces, then it shall be responsible for any damage to Work of the Contractor caused by the Owner's work or workers. Should the Owner have such placement or installation performed by another contractor, then the Owner shall require said contractor to be responsible for all such damage caused by its work, its workmen, or its subcontractor.

16.3.4 Modification of Paragraph 3.4 LABOR AND MATERIALS

16.3.4 Add Subparagraphs 3.4.4, 3.4.5, 3.4.6 and 3.4.7:

3.4.4 Materials shall conform to manufacturer's standards in effect at the date of issuance of the proposed Contract Documents and shall be installed in strict accordance with manufacturer's directions.

3.4.5 Where the Contract Documents require the Work, or any part of same, to be above the standards required by applicable laws, ordinances, rules and regulations and other statutory provisions pertaining to the Work, or above the quality of normal construction or trade standards, such Work shall be performed and completed by the Contractor in accordance with the Contract Documents.

3.4.6 Immediately after the issuance of a Letter of Intent or the award of the Contract for the Work to the Contractor, and prior to the first Request for Payment, The Contractor shall submit to the Architect a schedule indicating the name of manufacturers of all material and equipment which it and its Subcontractors propose for use in the Work. No material or equipment shall be ordered until acceptance of the manufacturer is received from the Architect.

3.4.7 Identifying Markings: Where the manufacturer's name, patent numbers, Underwriter's labels, model numbers or similar identifying marks are required, locate such markings as inconspicuously as possible. In no case will such marks be acceptable as part of basic design.

16.3.5 Modification of Paragraph 3.5 WARRANTY

16.3.5.1 Add Subparagraph 3.5.3:

3.5.3 The Contractor shall:

- .1 Warrant that all materials and workmanship of all of the Work of the Contract will be serviceable, satisfactory, and will perform dependably, without excessive or unusual maintenance or care, the functions for which it was designed and free of defects in materials or workmanship for a period of at least six (6) years, and for such longer periods and special requirements as may be specified for individual types of materials, equipment, or Work, under individual Sections of the Specifications. Such warranty is in addition to and independent of any warranty or guarantee of any Subcontractor, Supplier or Manufacturer.
- .2 Submit the above warranty, and all warranties required by the Contract Documents to be delivered by Subcontractors, executed by the Contractor in written form and deliver all to the Owner as a condition precedent to Final Payment.
- .3 The Contractor shall remedy at the Contractor's expense any failure to conform, or any

defect identified in materials or workmanship. In addition, the Contractor shall remedy at the Contractor's expense any damage to the Owner's real or personal property, when the damage is the result of: the Contractor's failure to conform to contract requirements or any defect of equipment, material or workmanship furnished.

- .4 The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty period with respect to the work repaired or replaced shall restart from the date of repair or replacement.
- .5 Warranty Process: The overall process that should be followed for handling a warranty item is described as follows:
 - a. Owner or Owner's designated representative shall notify the Contractor in writing, within a reasonable time after the discovery of any failure, defect or damage.
 - b. Within twenty-four (24) hours, Contractor shall acknowledge receipt of notice from Owner and shall respond in writing as to when Contractor or Contractor's representative will be onsite to review warranty item.
 - c. Contractor shall commence any work required hereunder within seven (7) working days after receipt of written notice to do so by the Owner. If The Contractor shall fail or neglect to do so or to complete the fulfillment of its obligations hereunder within fifteen (15) days of receipt of said notice or such longer period as may be authorized by the Owner, the Owner shall have the right to perform all or any part of the Work or employ another person to do all or part of such Work and charge the expense thereof to the Contractor.
- .6 With respect to all warranties, express or implied, from sub-contractors, manufacturers or suppliers for work performed and materials furnished under this contract, the Contractor shall:
 - a. Obtain all warranties for all aspects of the work.
 - b. Require all warranties to be executed, in writing for the benefit of the Owner.
 - c. Enforce all warranties for the benefit of the Owner.
- .7 Warranties shall be assignable and enforceable by all future Owners of the project.

16.3.7 Modification of Paragraph 3.7 PERMITS, FEES AND NOTICES

16.3.7.1.1 – 16.3.7.1.4 Add Subparagraphs 3.7.1.1 – 3.7.1.4:

- 3.7.1.1 The Contractor shall obtain a Certificate of Occupancy as required for partial and complete occupancy by the Owner. The Contractor shall pay all fees necessary to secure said Certificates and shall deliver said Certificate to the Architect or Owner.
- 3.7.1.2 The Contractor shall furnish to the local authorities all necessary bonds or cash deposits required as a pledge and security for the protection or maintenance of any public property or as otherwise stipulated.
- 3.7.1.3 Contractor shall be responsible for all approvals and permits not specifically enumerated as the Owner's responsibility in paragraph 2.3.1 hereof or in the Contract Documents.
- 3.7.1.4 A photocopy of the building permit shall be delivered to the Architect and Owner as soon

as it is obtained.

16.3.9 Modification of Paragraph 3.9 SUPERINTENDENT

16.3.9 Add Subparagraphs 3.9.4, 3.9.5 and 3.9.6:

- 3.9.4 The Contractor's Superintendent or his duly authorized representative, shall remain in attendance at the Site and shall be present at all times when work of any kind is being done, including work done at other than normal working hours.
- 3.9.5 The Contractor's Superintendent shall not be removed except for valid cause acceptable to the Architect and the Owner in which case another Superintendent acceptable to them shall be provided.
- 3.9.6 Any employee of the Contractor whom the Architect or Owner considers detrimental to the proper carrying out of the Work is to be removed promptly on the request of the Architect or Owner.

16.3.17 Modification of Paragraph 3.17 ROYALTIES AND PATENTS

16.3.17 Add Subparagraphs 3.17.1 and 3.17.2:

- 3.17.1 Use of Printed Materials: Contractors and suppliers shall agree that the Owner may, without cost, duplicate, publish, use, dispose of, and disclose in any manner and for any periods whatsoever, and have others so do, all Subject Data (whether or not copyrighted) which may be submitted or delivered to the Owner for use in the course of, or under, any Work performed for the Owner, or which may relate to said Work. By "Subject Data" is meant all writings (including, without limitation, instructions manuals, operating manuals, maintenance manuals and specifications), sound recordings, pictorial reproductions, drawings, prints, photographs and graphical representations, and works of a nature similar to any of the foregoing. In the event any such Subject Data shall be covered by copyright, Contractors and suppliers shall agree to grant to the Owner or obtain for the Owner the copyrighted material, a royalty-free, non-exclusive and irrevocable license, including a right to sublicense thereunder.
- 3.17.2 Any provision or provisions of these General Conditions or of the Contract to the contrary notwithstanding, the Owner shall have the right at any time to modify, remove, obliterate, or ignore any marking not authorized by the terms of the Contract on any piece of Subject Data furnished or delivered under the Contract.

16.3.18 Modification of Paragraph 3.18 INDEMNITY

16.3.18.1 Add Subparagraphs 3.18.1.1 – 3.18.1.6

- 3.18.1.1 Hold Harmless. The Contractor agrees to hold harmless the City against and from any and all liabilities, obligations, damages, penalties, claims, costs, charges, losses, and expenses, including without limitation, fees and expenses of attorneys, expert witnesses and other consultants which may be imposed upon, incurred by, or asserted

against the City by reason of, arising out of, or related to any of the following occurring during the performance of this Contract:

- a. any negligent or tortious act, error, or omission of the Contractor, or any of its personnel, employees, consultants, or subcontractors, agents or any entities associated, affiliated or subsidiary to the Contractor now existing or hereafter created, their agents and employees for whose acts any of them might be liable, including, but not limited to, any and all injury to the person or damage to the property of, or any loss or expense incurred by an employee of the City;
- b. any failure by the Contractor, or any of its agents and employees to perform their obligations either implied (industry standards) or expressed under this Contract;
- c. any violation of any federal, state or local statute, regulation, ordinance, permit or license by the Contractor, or any of its personnel, employees, consultants, or subcontractors, agents or any entities associated, affiliated or subsidiary to the Contractor now existing or hereafter created.

3.18.1.2 Assumption of Risk. The Contractor undertakes and assumes all risk of dangerous conditions, on all places where it will be performing the work, in order to determine whether such places are safe for the performance of the work. Except for acts of gross negligence or intentional misconduct by the City or its employees or agents, the Contractor also agrees to waive and release any claim or liability against the City for personal injury or property damage sustained by it or its agents or employees for personal injury or property damages while performing under the Contract.

3.18.1.3 Defense. In the event any action or proceeding shall be brought against the City by reason of any claim covered under this Section, the Contractor, upon notice from the City, shall at its own sole cost and expense, have the duty and the right to resist and defend the same; provided, however, the City shall also have the right to appoint another attorney to appear in any such litigation as co-counsel, at the City's expense.

3.18.1.4 Property and Materials. The Contractor agrees that it is the Contractor's responsibility, and not the responsibility of the City, to safeguard the property and materials that the Contractor or any of the Contractor's agents, subcontractors or employees, use or have in their possession while performing under this Contract. Further, the Contractor agrees to hold the City harmless for any loss of property and materials used pursuant to the Contractor's performance under this Contract which is in their possession, except if caused by the City's gross negligence or intentional misconduct.

3.18.1.5 No Limitation. The indemnification obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation or other employee benefits. In addition, the Contractor agrees to hold the City harmless from the payment of any deductible on any insurance policy.

3.18.1.6 Survival of Indemnification. The indemnification obligation under this Section shall survive the termination or expiration of this Contract.

16.4 Modification to ARTICLE 4 ARCHITECT

- 16.4.1 Modification to Paragraph 4.1 GENERAL:
 - 16.4.1.1.1 Add Subparagraph 4.1.1.1:
 - 4.1.1.1 Architect - As used herein and elsewhere in the Contract Documents, the term "Architect" shall mean PARTNERS in Architecture, PLC, 65 Market Street, Suite 200, Mount Clemens, MI 48043, acting individually or through any agents, consultants, or representatives duly authorized to act in its behalf, subject to the provisions of the Owner/Architect Agreement for the Project between Owner and PARTNERS in Architecture, PLC ("Architect").
- 16.5 Modifications of ARTICLE 5 SUBCONTRACTORS
 - 16.5.2 Modification of Paragraph 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK
 - 16.5.2.1 Add to Subparagraph 5.2.1:

The list of proposed subcontractors shall be submitted within 24 hours of bid opening by the low bidder(s), which list shall upon acceptance by the Owner be incorporated into the Contract.
 - 16.5.3 Modification to Paragraph 5.3 SUBCONTRACTUAL RELATIONS
 - 16.5.3 Add Subparagraphs 5.3.1:
 - 5.3.1 Contractor shall furnish Owner and Architect an electronic copy of each executed subcontract within ten (10) days after it is executed, but not later than forty-five (45) days after execution of the Owner – Contractor Construction Agreement.
- 16.7 Modifications to ARTICLE 7 CHANGES IN THE WORK
 - 16.7.1 Modification to Paragraph 7.1 GENERAL
 - 16.7.1 Add Subparagraphs 7.1.4, 7.1.5, 7.1.6 and 7.1.7:
 - 7.1.4 Proposal Request is a Change Proposal: A document issued by the Architect and signed by the Contractor, containing a price quotation for Changes in the Work as described by a written "Change Description" and supplemented when necessary by revised drawings all attached thereto.
 - 7.1.5 Contractor shall make no claims for extra cost on account of delay in completion of the Work caused by any Changes in the Work except as expressly provided in the executed Change Order authorizing said Change.
 - 7.1.6 Changes in Contract Sum:

For any adjustments to the Contract Sum based on other than the unit prices method, the Contractor agrees to charge and accept payment for his overhead, bonds,

insurance, field supervision, profit and all other general conditions items / related miscellaneous costs at the following percentages of the cost attributable to the change in the Work:

- .1 Ten percent (10%) for Work (labor and materials) by the Contractor not involving subcontractors;
- .2 Ten percent (10%) for Work (labor and materials) by subcontractors;
- .3 When both additions and credits are involved in any change, the allowable markup shall be figured on the basis of the net increase, if any;

7.1.7 A detailed breakdown of material (quantity and type) and an hourly breakdown of labor must be submitted with each request for additional compensation.

16.8 Modifications to ARTICLE 8 TIME

16.8.2 Modification to Paragraph 8.2 PROGRESS AND COMPLETION

16.8.2.1 Add to paragraph 8.2.1:

and that Contractor is capable of properly completing the Work within the contract time.

16.9 Modifications to ARTICLE 9 PAYMENTS AND COMPLETION

16.9.2 Modifications to Paragraph 9.2 SCHEDULE OF VALUES

16.9.2 Add to Subparagraph 9.2:

9.2 The schedule of values shall only be used after approval by Architect.

16.9.2.2 Add Subparagraph 9.2.1:

9.2.1 Initial Sworn Statements. Prior to commencement of the Work, the Contractor shall deliver to the Owner, a sworn statement, duly executed and acknowledged and in form satisfactory to the Owner, listing all subcontracts and the amount of each such subcontract, together with a similar sworn statement from each subcontractor and, where appropriate, from sub-subcontractors. This is in addition to the copies of the subcontracts as required in paragraph 5.3.1.

16.9.3 Modification of Paragraph 9.3 APPLICATIONS FOR PAYMENT

16.9.3.4 Add to Subparagraph 9.3.1.3:

9.3.1.3 Each application for payment shall be accompanied by the following, all in form and substance satisfactory to the Owner:

- .1 A duly executed and acknowledged sworn statement showing all subcontractors with whom the Contractor has entered into subcontracts, the amount of each such

subcontract, the amount requested for any subcontractor in the requested progress payment and the amount to be paid to the Contractor from such progress payment, together with similar sworn statements from all subcontractors and, where appropriate, from sub-subcontractors; and

- .2 Duly executed Waivers of Mechanic's and Material Liens establishing payment or satisfaction of all such obligations.

16.9.4 Modification to Paragraph 9.4 CERTIFICATES FOR PAYMENT

16.9.4 Add Subparagraph 9.4.3:

- 9.4.3 If so directed by the Owner or Architect, the Contractor shall, within fifteen (15) days from the date of Owner's remittance, submit partial waivers of lien signed by each Subcontractor designated by the Owner, in a form acceptable to the Owner, for the full amount of the sum included for said Subcontractor, in the Owner's remittance for the previous month. Failure to submit partial waivers of lien shall justify the withholding of future payments by the Owner until said delinquent waivers are received by the Owner.

16.9.4.4 Add Subparagraph 9.4.4:

- 9.4.4 The Owner agrees to make payments to the Contractor on account of the Contract provided in the Agreement.
 - .1 Following Substantial Completion: Following the date of Substantial Completion, the Contractor may request the Architect to inspect the project and deliver to Contractor a list of work necessary to Final Completion. Promptly following certification by the Architect to the Owner that the work on such list has been satisfactorily completed, the Owner will pay to Contractor such additional sum as may be necessary to bring the total payments to Contractor to 98% of the total Contract Sum, adjusted as provided in the Contract Documents.

16.9.6 Modification to Paragraph 9.6 PROGRESS PAYMENTS

16.9.6.1 Add to Subparagraph 9.6.1:

- 9.6.1 Payments shall be made at the sole discretion of Owner with the advice and comment from Architect.

16.11 Modification to Article 11 INSURANCE AND BONDS

11.1.1 Add paragraphs 11.1.1.1 – 11.1.1.8:

- 11.1.1.1 The Contractor shall provide the City with certificates of all insurance required in this section evidencing such coverage at the time of the Contractor's execution of this contract. The certificates of insurance shall name the City of Warren, City of Warren Downtown Development Authority, City of Warren Municipal Building Authority, the 37th

District Court, and all elected and appointed officials, employees and volunteers as individuals acting within the scope of their authority, as additionally insured.

- 11.1.1.2 All policies shall be endorsed to provide that the insurer shall give written notice to the City at least thirty (30) days in advance of any cancellation or expiration of the policy. The Contractor shall provide the City with written notice of any material change to any policy immediately upon receipt of notice of such material change. Prior to commencing work under this contract, the Contractor shall provide the City with copies of policies required by this contract. In the event that this contract is extended beyond its original term, the Contractor shall maintain the required insurance coverage during any extended term of this contract.
- 11.1.1.3 The Contractor shall not commence work, nor shall the contractor allow any subcontractor to commence work under this contract until the Contractor and the subcontractor have obtained a policy of insurance meeting the requirements of this section. The Contractor shall maintain at its expense and keep in effect during the term of this contract the following insurance:
- a. Workers Compensation Insurance for employees which meets Michigan's statutory limits. The Contractor agrees that it shall require the same Workers Compensation Insurance from any subcontractor retained by it to render any of the work;
 - b. Comprehensive Motor Vehicle Liability Insurance covering all owned, non-owned, or hired automobiles or trucks with minimum limits of \$1,000,000 combined single limit bodily injury and/or property damage for each accident. Such insurance shall comply with the provisions of the Michigan No Fault Insurance Law and shall provide coverage for Personal Protection Insurance, Property Protection Insurance, and Residual Liability Insurance;
 - c. Umbrella Liability Policy with a \$3,000,000 limit;
 - d. Commercial General Liability Insurance with a \$1,000,000 limit for each occurrence for bodily injury and property damage liability and a \$2,000,000 aggregate combined single limit for bodily injury and property damage liability. The policy shall contain a blanket contractual liability clause for all written contracts; and
 - e. X, C and U Hazard Policy with a \$2,000,000 limit on occurrence binder; and
 - f. City and Contractor's Protective Liability Insurance, naming the City and the Contractor as insured, with policy limits no less than those required for Commercial General Liability Insurance, as set forth above.
- 11.1.1.4 The policy shall include the following extensions:
- a. Contractual Liability.
 - b. Independent Contractor's Coverage.
 - c. Broad Form General Liability Extensions or equivalent.

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- d. Premises / Operations coverage.

- 11.1.1.5 Insufficiency of Insurer. In the event the City deems any insurer to be unsatisfactory, upon notification to the Contractor, the Contractor shall furnish forth a substitution of insurer acceptable to the City and copy of all required certificates of insurance in compliance with the Section. No additional payment shall be deemed due or shall be made by the City to the contractor because of the required substitution.
- 11.1.1.6 Builder's Risk Insurance:
 - a. 100% of Completed Value Form, including theft of materials from the Sites.
- 11.1.1.7 Products and Completed Operations coverage must have a minimum two-year extension of coverage following policy expiration. The Contractor and all subcontractors will be responsible for proving coverage for their own protection after that.
- 11.1.1.8 Truckers Pollution Liability Insurance (if removing contaminated materials):
 - a. Truckers Pollution liability insurance in the amount of \$1,000,000 per occurrence, see attached sample copy of Federal filing requirements and pollution liability endorsement number CA99481293 available on commercial auto policies.

16.11.1.2 Add paragraphs 11.1.2.1 – 11.1.2.6:

- 11.1.2.1 The Contractor shall finish bonds as described below, covering the faithful performance of the Contract and the payments of all obligations arising thereunder. The Contract will not be signed until the Owner has received the proper bond specified under this Article, issued by a bonding company licensed to do business in the State where construction will take place, and on the current list of Company's Holding Certificates of Authority as acceptable Sureties on Federal Bonds and as acceptable reinsuring companies as published in Circular 570 (Amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All bonds signed by an agent must be accompanied by a certificate copy of the authority to act.
- 11.1.2.2 Furnish both AIA A312 Performance Bond and AIA A312 Payment Bond in the amount of 100% of the Contract Price.
- 11.1.2.3 The performance Bond and Payment Bond shall be submitted in the exact form specified in Section 11.1.2.2 above, and with the certificates specified in Section 11.1.2.4, below, and no other modifications addendum whatsoever shall be allowed.
- 11.1.2.4 Duly executed, notarized and updated Acknowledgements of both the Principal and Surety and the Surety's Power of Attorney must be attached to each of the two required bonds.
- 11.1.2.5 Bond amounts shall not exceed the single bond limit for the Contractor's Bonding company as set forth in the Federal Register current as of the bid date.
- 11.1.2.6 Upon receipt of Notice to Award, contractor is to submit Bonds to the Architect, prior to signing the contract.

END OF SECTION 008000

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Bid / project schedule.
4. Work under separate contracts.
5. Future work.
6. Access to site.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

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

1.2 PROJECT INFORMATION

A. Project Identification: New Fire Station No. 1 and Fire Station No. 5.

1. Fire Station No. 1 location: 23211 Van Dyke Avenue, Warren, MI 48089.
2. Fire Station No. 5 location: 30619 Schoenherr Road, Warren, MI 48088.

B. Owner: City of Warren

1. Owner's Representative: Tom Bommarito, Director of Community, Economic & Downtown Development, One City Square, Suite 201, Warren, MI 48093-6726.

C. Architect: PARTNERS in Architecture, PLC; 65 Market Street, Suite 200, Mount Clemens, MI 48043.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The following is a brief project overview and is not meant to describe the complete scope of the project.

Fire Station No. 1:

A new single story, 3-bay Fire Station (Approximately 12,700 SF Gross Area) with (3) drive-through apparatus bays, fire fighter dorms, living and support spaces, a separate storage garage and associated site development on a site located north of Continental and south of Republic Avenues on the west side of Van Dyke Avenue, Warren Michigan upon property with a current street address of 23211 Van Dyke Avenue, Warren, Michigan. This property is adjacent to the Warren Civic Center South.

The project also includes the demolition and complete removal of the existing ReStore Building currently located on the corner of this site.

Fire Station No. 5.

A new single story, 3-bay Fire Station (Approximately 12,700 SF Gross Area) with (3) drive-through apparatus bays, fire fighter dorms, living and support spaces, and associated site development on a site located on the west side of Schoenherr Road, Warren Michigan upon property with a current street address of 30619 Schoenherr Road, Warren, Michigan.

The project also includes the demolition and complete removal of the (2) existing residential structures currently located on this site.

B. Type of Contract.

1. Project will be constructed under a single prime contract. The City has the option to hire a single contractor to construct both Fire Stations or two separate contractors to construct either of the Fire Stations.

1.4 BID / PROJECT SCHEDULE

A. The projected bid / project schedule milestones are as follows:

1. Issue Documents for bid: June 13, 2023.
2. Pre-Bid Meeting: June 21, 2023; 10:00am.
3. Last Day to Submit Questions: July 7, 2023; 5:00pm.
4. Bids Due: July 19, 2023; 12:30pm.
5. Contractor Interviews: Tentatively planned for July 21, 2023 and July 24, 2023. All bidders shall hold their calendars open on these days for a potential interview. Generally, the lowest three to four bidders will be called in for an interview. Interviews most likely will be held at the City of Warren, City Hall.
6. Projected Contract Award Date: August 2, 2023.
7. Desired Construction Commencement: September 18, 2023 (or sooner if possible).
8. Achieve Substantial Completion: November 22, 2024 (or sooner if possible).
 - a. Buildings must be ready for occupancy. All inspections / approvals must be received to allow occupancy.
9. Project Closeout: All project closeout activities shall be completed within thirty (30) days following the substantial completion date, but not later than December 23, 2024.

1.5 SITE PLAN APPROVAL – FIRE STATION NO. 5

- A. It is noted that site plan approval had not yet been applied for or received for the Fire Station No. 5 site.

1. The proposed schedule for obtaining site plan approval for the Fire Station No. 5 site is as follows:
 - a. Submit for site plan approval: June 21, 2023
 - b. Planning Commission Meeting: July 24, 2023
 - c. City Council – Final Site Plan Approval: August 15, 2023

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 1. Video surveillance / security system installation.
 2. Door access control system installation.
 3. Furniture procurement and installation.

1.7 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. 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. Streets and Walkways: Keep streets and walkways clear and available to the public and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 2. Contractor is not to use any part of the Warren Civic Center Site (adjacent site to Station No. 1) for parking, storing materials, etc. No construction traffic is permitted in the parking lot or on the grounds.

1.8 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 on site to normal business working hours of 7:00 a.m. to 7:30 p.m., Monday through Friday and 8:00 a.m. to 7:30 p.m., Saturday.
 1. Alternate Hours: Contractor may make a request to the Owner to allow alternate hours. Although the Contractor may request alternate hours, there are no guarantees that the Owner will be able to approve the request. The above stated hours coincide with the Owner's Noise Ordinance.

- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by 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 four 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 adjacent properties with Owner.
 - 1. Notify Owner not less than four days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.9 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Quantity allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices.
 - 2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.2 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.3 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance, unless other methods described elsewhere in the Contract Documents.
- B. 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 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect 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 under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. At Project closeout, credit unused amounts (based on unit pricing – Section 012200) remaining in the quantity allowance to Owner by Change Order.

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1.6 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between approved quantity used and the quantity allowance defined in paragraph 3.3 below. Unit price per specification section 012200 will be used to adjust the total cost up or down.
1. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

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: Undercutting Subgrade at Building Areas (Soil Corrections):* Include 150 Cubic Yards of soil corrections (removal of unsuitable soil and replacement with MDOT Class II granular material) in the base bid for Fire Station No. 1 and in the base bid of Fire Station No. 5 (for a total of 300 Cubic Yards). This quantity will be increased or decreased based upon the actual conditions in the field with the assistance of the Owner's testing engineer. The contract amount will be increased or decreased based upon the unit cost as described in specification section 012200 – Unit Prices.
1. Identify the cost for 150 cubic yards for Fire Station No. 1 in the location designated on the bid form. This cost is INCLUDED in the base bid for Fire Station No. 1.
 2. Identify the cost for 150 cubic yards for Fire Station No. 5 in the location designated on the bid form. This cost is INCLUDED in the base bid for Fire Station No. 5.
 3. This allowance includes material cost, receiving, handling, and installation and Contractor overhead and profit.
 4. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 012200 "Unit Prices."
 5. Contractor is not authorized to utilize allowance without written authorization from the Owner, Architect and Owner's Testing Engineer.

6. Approved uses will be defined by written Change Orders.
- B. Allowance No. 2: Undercutting Subgrade at Paved Areas (Soil Corrections): Include 100 Cubic Yards of soil corrections (removal of unsuitable soil and replacement with MDOT 21AA material) in the base bid for Fire Station No. 1 and in the base bid of Fire Station No. 5 (for a total of 200 Cubic Yards). This quantity will be increased or decreased based upon the actual conditions in the field with the assistance of the Owner's testing engineer. The contract amount will be increased or decreased based upon the unit cost as described in specification section 012200 – Unit Prices.
1. Identify the cost for 100 cubic yards for Fire Station No. 1 in the location designated on the bid form. This cost is INCLUDED in the base bid for Fire Station No. 1.
 2. Identify the cost for 100 cubic yards for Fire Station No. 5 in the location designated on the bid form. This cost is INCLUDED in the base bid for Fire Station No. 5.
 3. This allowance includes material cost, receiving, handling, installation and Contractor overhead and profit.
 4. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 012200 "Unit Prices."
 5. Contractor is not authorized to utilize allowance without written authorization from the Owner, Architect and Owner's Testing Engineer.
 6. Approved uses will be defined by written Change Orders.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for quantity allowances related to unit costs listed within this section.
 - 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit and other ancillary costs.
- B. Measurement and Payment: See individual Specification Sections and drawings for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1 – Undercutting Subgrade at Building Areas:
 - 1. Description: This item shall include the labor, supervision, equipment, trucking, unsuitable material removal and disposal and new material necessary for the excavation of unsuitable material as

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determined by the Owner's Testing Engineer. Work will include grading and compaction of the undercut area and installing MDOT Class II granular material to the proposed subgrade elevation. The material shall be installed at a maximum depth of 12" per lift. The work will be paid for by in-field measurement quantities per cubic yard, as determined by the Owner's Testing Engineer.

2. Unit of Measurement: Cubic Yard (measured in place).
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."

B. Unit Price No. 2 – Undercutting Subgrade at Paved Areas:

1. Description: This item shall include the labor, supervision, equipment, trucking, unsuitable material removal and disposal and new material necessary for the excavation of unsuitable material as determined by the Owner's Testing Engineer. Work will include grading and compaction of the undercut area and installing MDOT 21AA material to the proposed subgrade elevation. The material shall be installed at a maximum depth of 12" per lift. The work will be paid for by in-field measurement quantities per cubic yard, as determined by the Owner's Testing Engineer.
2. Unit of Measurement: Cubic Yard (measured in place).
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."

END OF SECTION 012200

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - 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: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 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 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change 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 CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail or forms acceptable to Architect.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 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.

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2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "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: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use 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 AIA Document G703.
 - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Each line item shall have separate "labor" and

“material” cost amounts. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

- a. Closeout Costs. Include separate line items under Contractor as well as principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and individual subcontract amounts.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
 9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders 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: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts of approved Change Orders and Construction Change Directives issued before last day of construction period covered by application.

- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance (with Owner as Certificate Holder), evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. 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.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Products list (preliminary if not final).
 5. Schedule of unit prices.
 6. Submittal schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

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11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707-1994, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.4 GENERAL COORDINATION PROCEDURES

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.

2. Plenum Space: Indicate subframing 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 / Electrical Rooms: Provide coordination drawings for mechanical / electrical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or form acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven 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.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 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.
- F. 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.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.7 PROJECT MEETINGS
- A. General: Schedule and conduct 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 five days of the meeting.
- B. Preconstruction Conference: 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. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Sustainable design requirements.
 - k. Preparation of record documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Parking availability.
 - t. Office, work, and storage areas.
 - u. Equipment deliveries and priorities.
 - v. First aid.
 - w. Security.
 - x. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect 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. Sustainable design requirements.
 - i. Review of mockups.

- j. Possible conflicts.
 - k. Compatibility problems.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. 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 weekly 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) Status of sustainable design documentation.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's construction schedule.
 2. Construction schedule updating reports.
 3. Daily construction reports.
 4. Site condition reports.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.
 2. PDF electronic file.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. Daily Construction Reports: Submit at bi-weekly intervals.
- E. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, 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.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 - 1. Use Microsoft Project, Primavera or Meridian Prolog. Other software may also be acceptable upon approval from Architect.
- B. Time Frame: Extend schedule from date established for the Notice of Award to date of final 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.
- C. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Structural steel.
 - b. Light fixtures and electrical equipment.
 - c. HVAC equipment and systems.
 - d. Aluminum window / storefront framing, doors and glazing.

- e. Interior doors and hardware.
 - f. Metal panels, trim and roofing.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Uninterruptible services.
 - b. Partial occupancy before Substantial Completion.
 - c. Use of premises restrictions.
 - d. Provisions for future construction.
 - e. Seasonal variations.
 - f. Environmental control.
 4. Work Stages: Indicate important stages of construction for each major portion of the Work.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.

- H. Two (2) Week Look-Ahead Schedule: Generate (2) Week Look-Ahead Schedule for review / distribution at each construction meeting. Update weekly.
- I. 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. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. 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.

1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 15 days of date established for the Notice of Award.
- 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.

1.7 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Testing and inspection.
 - 9. Meetings and significant decisions.
 - 10. Unusual events.
 - 11. Stoppages, delays, shortages, and losses.
 - 12. Meter readings and similar recordings.
 - 13. Emergency procedures.
 - 14. Orders and requests of authorities having jurisdiction.

15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

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

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's 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 SUBMITTAL SCHEDULE

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

1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Architect.
 4. Name of Contractor.

5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect, will return two copies.
4. Informational Submittals: Submit one paper copy of each submittal unless otherwise indicated. Architect will not return copies.
5. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using Architect's transmittal form, included in Project Manual.

E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
2. Paper: Prepare submittals in paper form, and deliver to Architect.

- 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- 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. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- E. 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.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. 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 unsuitable 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 that show 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 Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. 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. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
 - a. Three opaque copies of each submittal. Architect will return two copies.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
 4. Paper Transmittal: Include paper transmittal including complete submittal information indicated.
 5. 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.
6. 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 two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, will return one submittal with options selected.
7. 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 return one set.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) 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.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
- E. 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.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
- 1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
 - 2. 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.

3. **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.
4. **Material Certificates:** Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. **Product Certificates:** Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. **Welding Certificates:** Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. **Test and Research Reports:**

1. **Compatibility Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. **Field Test Reports:** Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. **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.
4. **Preconstruction Test Reports:** Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. **Product Test Reports:** Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. **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. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 **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 insufficient 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 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.

1.8 CONTRACTOR'S REVIEW

- A. Action Submittals 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. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it. Architect will indicate, via markup on each submittal, the appropriate action, as follows:
1. No comments noted
 2. Comments Noted
 3. Revise and send record copies
 4. Resubmit information
 5. Rejected
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Architect will discard submittals received from sources other than Contractor.
- E. Submittals not required by the Contract Documents will be returned by Architect without action.
- F. Architect will review initial submittal and up to one revision of same submittal. Subsequent reviews of additional re-submittals are considered additional services for the Architect. All additional time spent will be invoiced to the Owner on an hourly basis at the Architect's current billable rates. All additional service fees will be deducted from Contractor's contract amount, via deduct change order.

PARTNERS 21-146A/B
SUBMITTAL PROCEDURES
013300 - 8

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

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

- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 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.

1.4 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

- B. Permits, Licenses, and Certificates: For Owner's record, 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 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 reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Statement that products at Project site comply with requirements.
 - 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. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Statement that equipment complies with requirements.
 - 2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 3. Other required items indicated in individual Specification Sections.

1.7 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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 in material, design, and extent to those indicated for this Project.
- F. 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.
- G. Manufacturer's Technical 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.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. 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. When testing is complete, remove test specimens, assemblies, and 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 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 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.

1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, 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 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

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

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

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

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

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

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-qlulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.

35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.

82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.

127. MIA - Marble Institute of America; www.marble-institute.com.
128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.

175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrassod.org.
193. TRI - Tile Roofing Institute; www.tilerroofing.org.
194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
203. WI - Woodwork Institute; www.wicnet.org.
204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
205. WWPA - Western Wood Products Association; www.wwpa.org.

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.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

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.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.

7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeial Convention; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
- 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.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.

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7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development;
www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 014339 - MOCKUPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior mockups.

1.2 DEFINITIONS

- A. Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, and installers of major systems whose Work is included in integrated exterior mockups.
2. Review coordination of equipment and furnishings provided by the Owner for room mockups.
3. Review locations and extent of mockups.
4. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups and testing and maintain schedule for the Work.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups.

1.5 QUALITY ASSURANCE

A. Build mockups to do the following:

1. Verify selections made under Sample submittals.
2. Demonstrate aesthetic effects.
3. Demonstrate the qualities of products and workmanship.
4. Demonstrate acceptable coordination between components and systems.

- B. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.

3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
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.

C. Notifications:

1. Notify Architect seven (7) days in advance of the dates and times when mockups will be constructed.
2. Allow seven (7) days for initial review and each re-review of each mockup.

D. Approval: Obtain Architect's approval of mockups before starting fabrication or construction of corresponding Work.

1. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
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.

1.6 COORDINATION

- A. Coordinate schedule for construction of mockups, so construction, and review of mockups do not impact Project schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design support structure for free-standing mockups.

2.2 EXTERIOR MOCKUPS

- A. Design and construct foundation and superstructure to support free-standing integrated exterior mockups.
- B. Build integrated exterior mockups using installers and construction methods that will be used in completed construction.
- C. Use specified products that have been approved by Architect. Coordinate installation of materials and products specified in individual Specification Sections that include Work included in integrated exterior mockups.
- D. The Work of exterior mockups includes, but is not limited to, the following:
1. Masonry veneer and CMU substrate
 2. Cast stone features.

3. Air, moisture and weather barriers.
4. Thermal insulation.
5. Through-wall flashing.
6. Flashing and sheet metal trim.
7. Aluminum storefront windows
8. Joint sealants.

PART 3 - EXECUTION

- A. Construct integrated exterior mockups as indicated on Drawings. Construct mockups to demonstrate constructability, coordination of trades, and sequencing of Work; and to ensure materials, components, subassemblies, assemblies, and interfaces integrate into a system complying with indicated performance and aesthetic requirements.
- B. Photographic Documentation: Document construction of integrated exterior mockups with photographs in accordance with Section 013233 "Photographic Documentation." Provide photographs showing details of interface of different materials and assemblies.
- C. Provide and document modifications to construction details and interfaces between components and systems required to properly sequence the Work. Obtain Architect's approval for modifications.
- D. Retain approved mockups constructed in place.
- E. Exterior mockup will be considered defective if it does not pass inspections.
 1. Perform corrective action to bring mock-ups in conformance with requirements.
- F. Prepare inspection reports.

END OF SECTION 014339

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

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

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate methods to be used to avoid trapping water in finished work.

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 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch (60-mm) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

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 qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 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 Section 017700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 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 Section 011000 "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.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- 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. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 1. Provide superintendent with cellular telephone for use when away from field office.
- I. Electronic Communication Service: Provide a desktop computer in the primary field office adequate to access project electronic documents and maintain electronic communications.
 1. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 2. Internet Service: Provide wireless or broadband service with access to the internet.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) 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: Limited site area will be available for parking. Contractor responsible to coordinate parking arrangements for construction personnel. Do not negatively impact local neighboring streets with construction parking.
- 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 or 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 progress cleaning requirements in Section 017300 "Execution."
- 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.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: 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 erosion- and sedimentation-control Drawings and authorities having jurisdiction.
- D. 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.
- E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- F. 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.
- G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

- H. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner and Architect.
- I. 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.
- J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- K. 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.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- 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. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board 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. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 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.

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1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

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

C. Storage:

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

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. 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 other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

- b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

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

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.

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, use products for patching that comply with 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 Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence

and location of underground utilities, mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

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

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

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

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

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (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 Section 014000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 3. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 5. Submit test/adjust/balance records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect 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.

1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
- B. Inspection: Submit a written request for final inspection to determine 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.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas.
 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. MS Excel electronic file. Architect, will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. If the Owner or Architect determines that the cleaning is not sufficient, the Owner or Architect will request that the cleaning be redone; or at the Owner's option, the Owner will hire a professional cleaning company to perform the said work, and thus deduct the cost from the Contractor's final Pay Application, via Deduct Change Order.
- 3.2 REPAIR OF THE WORK
- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
 - B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

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1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

3.3 SCHEDULE

- A. All closeout activities shall be completed within thirty (30) days of the substantial completion date.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory.
 2. Emergency manuals.
 3. Operation manuals for systems, subsystems, and equipment.
 4. Product maintenance manuals.
 5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- C. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

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

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

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

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

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

appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set of marked-up record prints.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it.
 - c. Record and check the markup before enclosing concealed installations.
 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: DWG, Version: AutoCAD 2014 or later; Microsoft Windows operating system.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

B. Format: Submit record Specifications as annotated PDF electronic file.

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.

B. Format: Submit record Product Data as annotated PDF electronic file.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

B. Format: Submit miscellaneous record submittals as PDF electronic file.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
1. Demonstration of operation of systems, subsystems, and equipment.
 2. Training in operation and maintenance of systems, subsystems, and equipment.
 3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.

- f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.
- C. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

- D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Removing below-grade construction.
3. Disconnecting, capping or sealing, and removing site utilities.
4. Coordination with the fire department's ability to provide emergency services during all phases of construction and demolition.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. 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. Indicate proposed locations and construction of barriers.
1. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.
- C. Schedule of building demolition activities with starting and ending dates for each activity.
- D. Pre-demolition photographs or video.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

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1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.6 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
- C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before demolition of existing fire station, Owner will remove all items of value or necessity and move into the new construction fire station.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. On-site storage or sale of removed items or materials is not permitted.
- F. Arrange demolition schedule so as not to interfere with Owner's on-site operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Engage a professional engineer to 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 building demolition operations.

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 Utilities to be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
1. Coordinate with Owner to arrange shut-off of utilities at the existing building.
 2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 3. Completely remove all existing pipe or conduit within property lines.
 4. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 5. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
- C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.

- D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
1. Protect adjacent buildings and facilities from damage due to demolition activities.
 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION

- A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Maintain fire watch during and for at least four hours after flame-cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- C. Explosives: Use of explosives is not permitted.
- D. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each level or tier before disturbing supporting members on the next lower level.

- E. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- F. Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- G. Existing Utilities: Demolish existing utilities and below-grade utility structures completely within property lines. Cap and abandon utilities outside this area.
- H. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."
- I. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.
- J. Promptly repair damage to adjacent buildings caused by demolition operations.

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.
- B. Do not burn demolished materials.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations.
 - 1. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 024116

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division -1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes for the following:
 - 1. Footings and non-exposed foundation walls.
 - 2. Exposed foundation walls.
 - 3. Slabs-on-grade.
 - 4. Supported slabs.
 - 5. Concrete topping on precast structural concrete planks
- B. Drawings indicate final constructed work.
- C. Related Sections include the following:
 - 1. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - a. ACI 211.1-91, (R 2009) "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete", reapproved 2009.
 - b. ACI 301-10, "Specifications for Structural Concrete", 2010.
 - c. ACI 302.1R-04, "Guide for Concrete Floor and Slab Construction".
 - d. ACI 304 R-00, (R 2009) "Guide for Measuring, Mixing, Transporting and Placing Concrete", reapproved 2009.
 - e. ACI 304.2R-96, (R 2008) "Placing Concrete by Pumping Methods".
 - f. ACI 305 R-10, "Hot Weather Concreting", 2010.

- g. ACI 306 R-10, "Cold Weather Concreting", 2010.
- h. ACI 309 R-05, "Guide for Consolidation of Concrete", 2005.
- i. ACI 315-99, "Details and Detailing of Concrete Reinforcing", 2005.
- j. ACI 318-14, "Building Code Requirements for Reinforced Concrete", 2014.
- k. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice", 2009.
- l. ACI 347-04, "Guide to Formwork for Concrete", 2004.
- m. ACI SP-66(04) "ACI Detailing Manual", 2004.

B. Requirements of Regulatory Agencies: Comply with air pollution regulations of governing authorities.

C. Concrete Testing Service for Mix Designs and Material Evaluation:

- 1. Engage a testing laboratory to perform material evaluation tests, to design and test concrete mixes when using the "Trial Mix" option.

D. Special Inspections and Testing:

- 1. Refer to Division 1 Section "Testing and Inspection Services – Building".

E. Installation of Post-Installed Reinforcing:

- 1. Installers of post-installed reinforcing utilizing adhesive anchoring systems shall be certified from the ACI/CRSI Adhesive Anchor installation Certification Program.
- 2. Refer to Division 5 Section "Post-Installed Anchors" for adhesive anchoring system requirements.

F. Responsibility of Contractor:

- 1. The Contractor shall be fully responsible for:
 - a. The design, strength, safety and adequacy of all formwork, shoring, bracing and all methods of construction,
 - b. The mix design, strength, slump, consistency, finish and general quality of concrete.
 - c. The specifying herein of requirements for formwork or construction methods, water/cement ratios, slump, preliminary approvals by the Structural Engineer, inspection testing and quality control performed by the testing agency, or any other requirements of the Specifications shall be the minimum acceptable, and shall not eliminate, lessen or restrict in any manner the responsibility of the Contractor for all construction methods and for providing concrete in the completed structure that fully meets the strength, appearance and all other requirements of the Specifications and Drawings.
- 2. Materials and installed work may require testing and retesting at any time during progress of work.
 - a. Retesting of rejected materials installed shall be done at Contractor's expense.

1.5 ACTION SUBMITTALS

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

B. Product Data:

1. Submit admixture requirements as outlined in Part II of this specification.
2. Submit product data for proprietary materials and items, including steel-reinforcement, forming accessories, admixtures, patching compounds, water stops, joint systems, dissipating curing compounds, curing compounds, and others as requested by Structural Engineer.

C. Concrete Mix Design:

1. Submit written reports to Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work.
 - a. Testing for material certification of compliance with ASTM and MDOT Standards shall be performed not more than 90 days from receipt of submittal by the Structural Engineer.
 - b. Product data for concrete materials including but not limited to the following shall be submitted to the Structural Engineer:
 - 1) Portland cement.
 - 2) Fly ash.
 - 3) Slag cement (GGBF).
 - 4) Silica fume.
 - 5) Normal weight aggregates.
 - 6) Fine aggregates.
2. No concrete may be placed until the appropriate design mix has been approved by the Structural Engineer.

D. Joint Layout:

1. Submit proposed location of:
 - a. Construction joints.
 - b. Shrinkage control joints.
2. Do not place concrete until Structural Engineer has approved joint locations.

E. Shop Drawings:

1. Submit shop drawings for reinforcement, for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66, "ACI Detailing Manual"; showing:
 - a. Bar schedules,
 - b. Stirrup spacing,
 - c. Diagrams of bent bars,
 - d. Arrangement of concrete reinforcement.
2. Reinforcement Shop Drawings shall include:
 - a. Setting plans,
 - b. Layout of slab reinforcing
 - c. Bending diagrams,

- d. Cutting lists,
 - e. Other information so as to completely and unambiguously define and establish the location, spacing, size, length, shape, splicing, keying at construction joints and all other pertinent information as required.
- 3. Drawings shall show grades of reinforcing steel.
 - 4. Opposite hand reinforcing shall be detailed separately.
 - 5. Each shop drawing shall show splice length for every size and type of bar used.
 - 6. Indicate type, size and location of all accessories required for the proper assembling, placing and support of the reinforcement.
 - 7. Show and detail reinforcing around all openings, depressions, construction and control joints, trenches, sleeves, inserts and other project requirements affecting reinforcing details and placing.
- 8. Coordination With Other Trades:
 - a. The Contractor shall provide a single set of drawings indicating size and location of items to be included in the cast-in-place concrete.
 - b. The locations shall be superimposed on the structural drawings for the affected areas.
 - 1) Sleeves (horizontal and vertical):
 - a) Indicate dimension and location.
 - (1) Note: Sleeves through beams are not acceptable, unless specifically shown on the structural documents.
 - 2) Conduits/Piping.
 - a) Embedment of conduits/piping is only permitted when specifically shown on the structural documents.
 - 3) Other openings, cutouts, or recesses for A/M/E/ trades. Indicate location and size.
 - a) Openings, cutouts, or recesses for beams and joists are not acceptable unless specifically shown on the structural drawings.
 - 4) Attachment plates, inserts, etc. for A/M/E trades.
 - a) Indicate location of each item.
 - 5) Locations of polished concrete slab on grade.
 - a) Refer to architectural finish schedule for locations.

F. Reports:

- 1. Submit concrete design mixes based on criteria:
 - a. Laboratory test reports of trial mixes.

- b. Statistical analysis for consecutive samples from field experience in accordance with ACI 318 requirements.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Smooth Finish:

1. Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints
 - a. Use plywood complying with DOC PS-1 "B-B (Concrete Form) Plywood"; Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

B. Form Coatings:

1. Provide commercial formulation form-coating compounds low VOC that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

C. Form Ties:

1. Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
2. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 REINFORCING MATERIALS

A. Reinforcing Bars:

1. ASTM A 615, Grade 60, deformed.

B. Steel Wire: ASTM A 1064, plain, cold-drawn steel.

C. Welded Wire Reinforcing (WWR): ASTM A 1064, welded steel wire fabric.

1. WWR shall be in sheets, not rolls.

D. Deformed Steel Wire: ASTM A 1064.

E. Welded Deformed Steel Wire Reinforcing: ASTM A 1064.

F. Mechanical Splices:

1. Type 1: Develop at minimum 125 percent of specified minimum yield strength, f_y , of the rebar products:
 - a. Products:
 - 1) "Bar-Lock S/CA" Series (D-250-SCA); Dayton Superior; www.daytonsuperior.com.
 - 2) "Bar Grip – Standard Type 1" Series, Bar-Splice Products, www.barsplice.com.
- G. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Use wire-bar-type supports complying with CRSI specifications.
 1. Individual and continuous slab bolsters and chairs shall be of a type to suit the various conditions encountered and must be capable of supporting a 300-lb. concentrated load without measurable permanent deformation of the reinforcement or supports or indentation of the supporting surface.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1).
 3. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - a. For slab-on-grade with vapor retarders, use supports that will not damage the vapor retarder.
 4. Support Reinforcement for slabs on grade by steel supports designed for the purpose or precast concrete bricks. Wood blocks, stones, brick chips, etc., are not permitted.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
- B. Cementitious Materials:
 1. Fly Ash: ASTM C 618, Type C or F, with alkali less than 1.5%.
 - a. For air entrained concrete restrict loss on ignition to less than 1.5%.
 - b. Do not use fly ash in:
 - 1) Slabs to receive an adhered finish.
 - 2) Structural elements exposed to view.
 - 3) Concrete slabs on grade to be polished/stained.
 - c. Fly ash containing ammonia shall be mitigated prior to shipment to the concrete producer.
 - 1) Dosage of mitigation agent to be appropriate to amount of ammonia in fly-ash.
 - d. Maximum Dosage: 25% (by weight) of cementitious materials when no slag cement is used.
 2. Slag Cement: ASSTM C989, Grade 100 or 120.
 - a. Maximum Dosage: 25% (by weight) of cementitious materials when no fly-ash is used.

- b. Do not use in structural elements exposed to view.
 - c. Do not use in concrete slabs on grade to be polished/stained.
- C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete. Combined aggregate gradation shall be a uniform well graded mixture, with all sieve sizes represented.
- 1. Restriction: The use of Blast Furnace Slag as an aggregate is not permitted.
 - 2. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 - 3. For slabs use aggregate certified as non-alkali-reactive.
 - 4. Maximum designated sizes of normal weight aggregate shall be as follows:
 - a. 1-1/2" for concrete in foundations.
 - b. 1-1/2" for concrete in slabs-on-grade 5" or greater thickness.
 - c. Pea-gravel 3/8" for sections less than 2" thick.
 - d. 3/4" for all other concrete.
- D. Fine Aggregates ASTM C 33, MDOT 2NS.
- 1. Fineness modulus 2.0 to 3.0 for pumped concrete.
- E. Water: ASTM C 1602 and Potable.
- F. Admixtures
- 1. General:
 - a. Admixtures for concrete shall not contain intentionally-added chlorides.
 - b. The Contractor shall certify that admixtures are:
 - 1) Compatible with any other admixtures used in the concrete mix
 - 2) Compatible with concrete components such as fly-ash and or slag, either one or both if used in the proposed concrete mix.
 - 3) Compatible with any required adhesive for a given floor finish.
 - c. Admixture dosage shall take into account:
 - 1) Type of cement
 - 2) Fineness of sand
 - 3) Temperature and wind conditions at time of concrete placement
 - 4) Any other items affecting the performance as listed on the admixture-manufacturer's written instructions.
 - d. Mix design shall contain the admixtures which will be used for the concrete.
 - e. Substitution or addition of admixtures from those listed in the mix design or deviation of admixtures from the mix design shall be in accordance with Division 01, Section "Substitutions".
 - 2. Air-Entraining Admixture: ASTM C 260.

- a. Products:
 - 1) Use manufacturer's product for specific design mix.
 - a) Products vary depending on the types of admixtures and cementitious materials in the design mix.
 - 2) Use products by one the following manufacturers:
 - a) Euclid Chemical; www.euclidchemical.com.
 - b) W.R. Grace; www.na.graceconstruction.com.
 - c) BASF Corporation; www.master-builders-solutions.basf.us.
 - d) Sika Corp. www.sikacorp.com.
3. Water-Reducing Admixture: ASTM C 494, Type A.
 - a. Products:
 - 1) "Eucon MR"; Euclid Chemical; www.euclidchemical.com.
 - 2) "WRDA 27"; W.R. Grace & Co. www.na.graceconstruction.com.
 - 3) "Master Pozzolith" Series or "MasterPolyheed" Series; BASF Corporation, www.master-builders-solutions.basf.us.
4. High-Range Water-Reducing Admixture (HRWR, Superplasticizer): ASTM C 494, Type F.
 - a. Products:
 - 1) "Eucon 37"; Plasto 5000; Eucon Series; Euclid Chemical; www.euclidchemical.com.
 - 2) "ADVA Flow Series" or "Daracem"; W.R. Grace www.na.graceconstruction.com.
 - 3) "MasterRheobuild 1000" or "MasterGlenium" Series; BASF Corporation; www.master-builders-solutions.basf.us.
 - 4) "Sikament 300"; Sika Corp.; www.sikacorp.com.
5. Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
 - a. Products:
 - 1) "Accelguard 80"; Accelguard 90; Euclid Chemical; www.euclidchemical.com.
 - 2) "Daraset" or "Polar-Set"; W.R. Grace; www.na.graceconstruction.com.
 - 3) "MasterSet FP 20" (formerly "Pozzutec 20+") or "MasterSet AC 534" (formerly "Pozzolith NC 534"); BASF Corporation; www.master-builders-solutions.basf.us.
6. Water-Reducing, Retarding Admixture: ASTM C 494, Type B or D.
 - a. Products:
 - 1) "Eucon Retarder 75"; Euclid Chemical; www.euclidchemical.com.

- 2) "Daratard-17"; W.R. Grace; www.na.graceconstruction.com.
- 3) "MasterSet R" Series or "MasterSet DELVO" Series; BASF Corporation; www.master-builders-solutions.basf.us.
- 4) "Plastiment"; Sika Corporation; www.sikacorp.com.

2.4 RELATED MATERIALS

A. Control Joint Filler:

1. Filler not exposed to U.V.
 - a. The joint filler shall be a 2 component , 100% solids compound , with either one of these 28 day Shore Hardnesses (ASTM D 2240): Shore A 90, Shore D 50
 - b. Products:
 - 1) "Euco 700"; Euclid Chemical; www.euclidchemical.com
 - 2) "MM-80 Grey"; Metzger McGuire; www.metzgermcguire.com
 - 3) "Sikadur 51 SL", Sika; www.sikaconstruction.com
 - 4) "Sure Fil J52"; Dayton Superior; www.daytonsuperior.com.
2. Filler exposed to U.V.
 - a. The joint filler shall be a 2 component polyurea 100% solids compound, with a 28 day shore hardness (ASTM 2240) of 80-100.
 - b. Products indicated below may be used at contractors option at locations not exposed to UV.
 - c. Products:
 - 1) "EUCCO QWIKjoint UVR", Euclid Chemical; www.euclidchemical.com.
 - 2) "MasterSeal CR 100" BASF Corporation; www.master-builders-solutions.basf.us.

B. Pre-Formed Isolation Joint Material:

1. Apply around columns and other base isolation applications.
2. Unless otherwise restricted, contractor may choose one of the following materials:
 - a. Asphalt.
 - b. Polyethylene.
 - c. Recycled rubber.
3. Asphalt: Preformed bituminous type per ASTM D 994; 3/8 inch min. thick.
 - a. Provide one of the following including factory approved materials:
 - 1) "Asphalt Expansion Joint", W.R. Meadows; www.wrmeadows.com
 - 2) "Servicised Code 1301", W.R. Grace; www.na.graceconstruction.com
4. Polyethylene: Preformed closed-cell isomeric polymer type per ASTM D 1752, ½ inch min. thick unless otherwise shown.
 - a. Provide one of the following including factory approved materials:

- 1) "Expand-O-Foam 1380 Series", Williams Products Inc.; www.williamsproducts.net
 - 2) "Ceramar"; W.R. Meadows, Inc.; www.wrmeadows.com
5. Recycled Rubber:
- a. Provide:
 - 1) Reflex rubber expansion joint filler; J. D. Russell Co.; www.jdrussellco.com.
- C. Water stops:
1. Acceptable types:
 - a. Bentonite.
 - b. Flexible PVC.
 - c. Flexible Rubber.
 2. Bentonite Waterstops:
 - a. Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, $\frac{3}{4}$ by 1 inch (19 by 25 mm).
 - 1) Include manufacturer's recommended primer adhesive.
 - b. Products:
 - 1) Carlisle Coatings & Waterproofing, Inc.; CCW-MiraSTOP; www.carlisle-ccw.com
 - 2) CETCO; Volclay Waterstop-RX; www.cetco.com.
 - 3) Concrete Sealants Inc.; Conseal CS-231; www.conseal.com.
 - 4) Masco; Waterstop-RX; www.masco.net.
 - 5) Barrier-Bac; Barrier-Bac Waterstop; www.barrierbac.com.
 3. Flexible PVC Waterstops:
 - a. CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints.
 - b. Factory fabricate corners, intersections, and directional changes.
 - c. Manufacturers: Provide products by one of the following:
 - 1) BoMetals, Inc.; www.bometals.com
 - 2) Greenstreak; www.greenstreak.com.
 - 3) Vinylex Corp.; www.vinylexwaterstop.com
 - d. Profile: Flat, dumbbell with center bulb or flat, dumbbell without center bulb.
 - e. Dimensions: Size to suit joints.
 - f. Splices, Intersections, directional changes:
 - 1) Provide PVC water-stop manufacturer's factory fabricated fittings. These fittings shall be miter-cut and heat-welded.
 - 2) Provide square edges to install these fittings with straight edge splices only.
 - 3) Provide sufficient extensions, in the 15 inch to 18 inch range, for ease of field-installation.

- 4) Provide factory-installed metal eyelets.
4. Flexible Rubber Waterstops:
- a. CE CRD-C 513 for embedding in concrete to prevent passage of fluids through joints.
 - b. Products:
 - 1) Greenstreak; www.greenstreak.com.
 - 2) Williams Products, Inc.; www.williamsproducts.net.
 - c. Profile: Flat, dumbbell with center bulb or flat, dumbbell without center bulb.
 - d. Dimensions: Size to suit joints.
 - e. Splices, intersections, directional changes:
 - 1) Provide premolded fittings to accommodate splices, intersections and directional changes.
 - 2) Provide manufacturer recommended grid paper, cleaning alcohol and adhesive.
 - 3) Provide factory-installed metal eyelets.
- D. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
1. Products: Non-shrink, non-staining, non-metallic grout providing placement versatility: Plastic flowable. Provide one of the following:
 - a. "MasterFlow 100", BASF Corporation; www.master-builders-solutions.basf.us.
 - b. "NS Grout" Euclid Chemical; www.euclidchemical.com.
 - c. "Duragrout"; L & M Const. Chemical Co.; www.lmcc.com.
 - d. "Five Star Grout"; U.S. Grout Corp.; www.fivestarprouducts.com.
 - e. "1107 Advantage Grout"; Dayton Superior; www.daytonsuperior.com.
 2. Products: Non-Metallic High Flow Grout. High flow grout is designed for use where high tolerance, high strength and high fluidity are required. High flow grout shall comply with ASTM C 1107 and CRD C 621. Provide one of the following:
 - a. "Hi-Flow Grout"; Euclid Chemical; www.euclidchemical.com.
 - b. "MasterFlow 928"; BASF Corporation; www.master-builders-solutions.basf.us.
 - c. "Sure Grip High Performance Grout"; Dayton Superior; www.daytonsuperior.com.
- E. Vapor Retarder:
1. Comply with ASTM E 1745-09, Class A.
 2. Provide one of the following:
 - a. "Perminator 10 Mil" – W.R. Meadows; www.wrmeadows.com.
 - b. "Stego Wrap 10 Mil" – Stego Industries; www.stegoindustries.com.
 - c. "Vapor Block 10 Mil" – Raven Industries; www.vaporblock.com.
 3. Provide manufacturer's recommended mastics, gusset tape and perimeter edge-seal accessories for a complete installation.

- F. Moisture-Retaining Cover: One of the following, complying with ASTM C171.
1. Waterproof paper.
 2. Polyethylene-coated burlap (skid resistant).
- G. Liquid Membrane Forming Curing Compounds:
1. Comply with ASTM C-1315, Type I, Class A.
 - a. 25% minimum solid content
 - b. Moisture loss 0.40 Kg/m² when applied at 300 sq.ft./gal
 2. Provide one of the following:
 - a. "Super Diamond Clear VOX", Euclid Chemical; www.euclidchemical.com
 - b. "MasterKure CC 250SB" (formerly "Kure-N-Seal 25LV"), BASF Corporation; www.master-builders-solutions.basf.us
 - c. "Cure & Seal 1315 J22WB"; Dayton Superior; www.daytonsuperior.com.
- H. Dissipating Curing Compounds:
1. Removal required if flooring material is applied to area.
 2. Removal procedure to comply with the applied flooring manufacturer's requirements.
 3. Products shall comply with ASTM 309, Type 1:
 - a. "Kurez DR Vox", Euclid Chemical; www.euclidchemical.com.
 - b. "Clear Resin Cure J11W", Dayton Superior; www.daytonsuperior.com.
 - c. "L & M Cure R"; www.lmcc.com.
- I. Rapid Dissipating Curing Compound:
1. Removal required if flooring material is applied to area.
 2. Removal procedure to comply with applied flooring manufacturer's requirements.
 3. Products shall comply with ASTM 309.
 - a. "Clear Cure VOCJ7WB", Dayton Superior; www.daytonsuperior.com.
 - b. "Kurez DR VOX"; Euclid Chemical; www.euclidchemical.com
- J. Dissipation Curing Compound – Cleaner:
1. Products:
 - a. "Citrus Clean J48", Dayton Superior; www.daytonsuperior.com.
 - b. "Euco Clean + Strip", Euclid Chemical; www.euclidchemical.com.
- K. Self-Leveling Compound:
1. Free-flowing, self-leveling, pumpable, cement-based compound for applications from one inch thick to feathered edges.
 2. Products:

- a. "K-15"; Ardex, Inc.; www.ardex.com.
 - b. "Super Flo-Top"; Euclid Chemical; www.euclidchemical.com
 - c. "MasterTop 110SL, (formerly MasterTop 110 Plus Underlayment), BASF Corporation, www.master-builders-solutions.basf.us.
 - d. "Econolevel"; Dayton Superior; www.daytonsuperior.com.
3. Primer: Manufacturer's recommended product for substrate conditions.
 4. Aggregate: For application of excess thicknesses where manufacturer recommends coarse aggregate or coarse sand to be added.
 - a. Well-graded, washed gravel or coarse sand, sized to meet manufacturer's requirements for maximum depth.
- L. Bonding Compound:
1. Interior (Polyvinyl Acetate Base):
 - a. "Euco Weld"; Euclid Chemical; www.euclidchemical.com.
 - b. "Weld-Crete"; Larsen Products Corp.; www.larsenproducts.com
 - c. "PVA Bonding Agent J41" Dayton Superior; www.daytonsuperior.com.
 2. Exterior (Acrylic Latex Base):
 - a. "Acrylic Bonding Agent J40" Dayton Superior; www.daytonsuperior.com.
 - b. "Tammsweld"; Euclid Chemical; www.euclidchemical.com
- M. Epoxy Bonding Compound/Adhesives:
1. Standard Working Time (90 minutes +/-): ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material "Type"; "Grade"; and "Class" to suit project requirements
 - a. Products:
 - 1) "Dural 452 Epoxy Line"; Euclid Chemical; www.euclidchemical.com
 - 2) "MasterEmaco ADH Series" (formerly "Concresive" Series), BASF Corporation; www.master-builders-solutions.basf.us
 - 3) "Sikadur 32 Hi-Mod Series"; Sika Corp.; www.sikaconstruction.com.
 - 4) "Sure Bond J58"; Dayton Superior; www.daytonsuperior.com.
 2. Long Term Working Time (16 hours +/-): Three component water based epoxy-cementitious bonding agent.
 - a. Products:
 - 1) "Duralprep A.C.", Euclid Chemical, www.euclidchemical.com.
 - 2) "MasterEmaco P 124" (formerly "Emaco P24"), BASF Corporation www.master-builders-solutions.basf.us.
 - 3) "Armatec 110 EpoCem", www.sikaconstruction.com.
 - 4) "Perma Prime 3C"; Dayton Superior; www.daytonsuperior.com.

N. Sealer:

1. Interior Slabs:

a. General:

1) Acrylic, high solids liquid membrane sealer.

- a) Minimum Solids Content: 20%.
- b) Non-yellowing to ultraviolet exposure.
- c) Provide glossy finish.

b. Products:

1) Cure-And-Seal complying with ASTM C-1315.

- a) "Super Diamond Clear VOX", Euclid Chemical; www.euclidchemicals.com
- b) "Cure & Seal 1315 J22WB", Dayton Superior; www.daytonsuperior.com.
- c) "MasterKure CC 250SB" (formerly Kure N Seal 25LV"), BASF Corporation; www.master-builders-solutions.basf.us.

2) Sealer complying with ASTM C-1315.

- a) "Ultra Seal EF", Dayton Superior; www.daytonsuperior.com.
- b) "EverClear VOX", Euclid Chemical; www.euclidchemical.com

2. Exterior Slabs

a. Definition: "Exterior Slab", slab located outside the "conditioned" (heated/air conditioned) space; such as sidewalks not shown on civil documents, slabs underneath building overhangs, slabs underneath canopies.

b. General:

1) Siloxane or silane penetrating sealer.

c. Products:

- 1) "Barcade Silane 40"; Euclid Chemical; www.euclidchemical.com.
- 2) "MasterProtect H 440" (formerly Enviroseal 20"), BASF Corporation; www.master-builders-solutions.basf.us
- 3) "Weather Worker 40% J29"; Dayton Superior Co.; www.daytonsuperior.com.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. General:

1. Concrete Mix Design:

- a. Mix designs shall take into account seasonal variations in climatic conditions.
- b. Mix design shall be directed to reducing the amount of cementitious materials.

- c. See section "Concrete Materials" for required use applications for low-alkali-cement.
- d. See section "Concrete materials" for limits of use for cementitious materials.
- e. Alkali Restriction:
 - 1) Limit total alkali from all sources (cement, aggregate, etc.) for floor slab and exterior usage to 5 pounds per cubic yard.
- f. Chloride Restrictions:
 - 1) Calcium chloride or admixtures containing intentionally added chlorides are prohibited.
- g. Basic mix proportions shall be established by the Contractor in accordance with ACI 211.1 and Section 5.3, (field experience or trial batches) of ACI 318 with constituents to be used in the project.
 - 1) Field Experience:
 - a) f_c' equals or is less than 5000 psi
 - 1) Provide a record, based on ACI 318 criteria for consecutive strength tests, representing similar materials and conditions to those expected.
 - 2) The strength used as the basis for selecting proportions shall exceed the nominal design strength by at least $(1.34 s_s)$ or $(2.33 s_s - 500)$ whichever value is larger,
 - 3) s_s is the standard deviation as described in ACI 318, sections 5.3.1 and R5.3.1.
 - 4) Where less than 30 but more than 15 consecutive tests are available, s_s shall be modified in accordance with ACI-318 Table 5.3.1.2.
 - 5) The consecutive tests shall be based on field samples taken within 365 days of submittal received by Structural Engineer.
 - b) If the standard deviation exceeds 800 psi proportions shall be selected to produce an average strength at least 1200 psi greater than the nominal design strength.
 - c) The tests used to establish standard deviation shall represent concrete produced to meet a specified strength or strengths within 1000 psi of that specified for the proposed work.
 - 2) Trial Batch:
 - a) When trial batches are used as a basis for determining mix designs, the mix proportions of each type of concrete to be used in the work shall be based on curves showing the relationship between water content, cement content, and 7 and 28 days compressive strengths of concrete made using the proposed materials.
 - b) The curves shall be determined by 4 or more points, each representing an average of at least 4 test specimens at each age, and shall have a range of values sufficient to yield the desired data, including all the compressive strengths called for on the Plans, without extrapolation.

- c) Average strength of the design mix shall be:
 - 1) f_c' equals or is less than 5000 psi : 1200 psi greater than the nominal design strength
- d) Make proper allowances to compensate for the weakening effect of the air entrainment.

B. Normal Weight Concrete:

- 1. Definition
 - a. w/cm: water/(cement + cementitious materials) ratio by weight.
 - b. Shrinkage measured at 28 days, ASTM C157 modified, 7 day moist cured.
- 2. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
 - a. Compressive strength, as shown on drawings, no air entrainment:
 - 1) w/cm 0.58 maximum. Use for foundations, grade beams, and other areas not requiring air entrainment.
 - b. Compressive strength, as shown on drawings, no air entrainment:
 - 1) w/cm 0.53 maximum. Use for concrete slabs on grade to be polished/stained.
 - c. Compressive strength, as shown on drawings; with air entrainment.
 - 1) w/cm, 0.45 maximum. Use for concrete at exterior slabs.

C. Adjustment to Concrete Mixes:

- 1. Mix design adjustments may be requested by Contractor.
 - a. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Structural Engineer before using in work.

D. Admixtures:

- 1. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
 - a. Use water-reducing admixtures in concrete as required for placement and workability.
 - b. Use HRWR in concrete for parking structure slabs, concrete required to be watertight, and concrete with w/cm ratios of less than 0.45.
 - c. Add specified accelerating/retarding admixtures for proper finishing as required by environmental conditions, such as temperature, wind, humidity, exposure to direct sun-light, etc.

- 1) Water-reducing admixtures for concrete with w/cm ratios of 0.45 and higher may be one of the following:
 - a) Water-reducing.
 - b) Mid-range.
 - c) High-range.
 2. Air-entraining admixtures.
 - a. Use air-entraining admixture in exterior exposed concrete.
 - b. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent from the following:
 - c. Exterior concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - 1) 6.0 percent. 1-inch max. aggregate.
- E. Slump Limits for Normal-Weight Concrete:
1. Proportion and design mixes to result in concrete slump at point of truck-discharge as follows:
 - a. Slabs: Not more than 4 inches.
 - b. Reinforced foundation systems: Not less than 2 inches and not more than 4 inches.
 - c. Concrete containing HRWR: Not more than 8 inches after addition of HRWR to 2-inch to 3-inch slump concrete.
 - d. Other concrete: Not more than 5 inches.

2.6 CONCRETE MIXING

- A. Ready-Mix Concrete: Concrete shall be mixed and delivered in accordance with the requirements set forth in the "Standard Specifications for Ready-Mixed Concrete" (ASTM Designation C-94).
1. "Discharge Time": Is time frame from the introduction of mixing water until completion of the discharge at the job site.
 2. Mixing: When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharged completely within 90 minutes during normal temperatures.
 - a. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 90 minutes to 75 minutes.
 - b. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Delivery Tickets:
1. With each load of concrete delivered to the job there shall be furnished by the ready-mixed producer duplicate delivery tickets, one for the Contractor and one for the Architect-Engineer.
 2. Delivery tickets shall provide the following information:

- a. Date
- b. Name of ready-mixed concrete plant.
- c. Job location.
- d. Contractor.
- e. Type and brand name of cement.
- f. Class and cement/cementitious material content in pounds per cu.yd. of concrete.
 - 1) Types and amounts of cementitious materials.
- g. Truck number.
- h. Time dispatched.
- i. Amount of concrete in load, in cu. yds.
- j. Admixtures in concrete.
- k. Maximum sizes of aggregate.
- l. Type and amount of field-added hydration-controlling admixture.

PART 3 - EXECUTION

3.1 EXAMINATION AND ACCEPTANCE OF CONSTRUCTION IN PLACE

- A. Examine construction in place. Notify the Owner's Representative in writing of conditions detrimental to the proper and timely completion of the work. Defects which may influence satisfactory completion and performance of the work shall be corrected in accordance with the requirements of the applicable section of the specifications and in a manner acceptable to the Owner's Representative, prior to commencement of the work. Commencement will be construed as construction in place being acceptable for satisfying the requirements of this section.

3.2 PREPARATION

- A. Field Measurements and Tolerances:
 1. Take field measurements to verify or supplement dimensions shown. Be responsible for accurate fit of specified Work.
 2. If any concrete surface is placed or finished outside of the tolerances specified, or if inserts are misplaced or omitted, any remedial work shall be performed by the Contractor at his expense. The cost of evaluation and redesign of remedial work by the Structural Engineer shall be borne by the Contractor.

3.3 FORMS

- A. Restrictions:
 1. Formwork shall accommodate dowels shown on the structural drawings or the shop drawings, either one or both; therefore any proposed drilling of post-installed anchors in order to simplify form work to what in the Contractor's opinion may be equal strength of dowels is not acceptable.

B. General:

1. Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads.
2. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
3. Maintain formwork construction tolerances complying with ACI 301 and ACI 117.
4. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
 - a. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.
 - b. Use selected materials to obtain required finishes.
 - c. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
5. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
 - a. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
6. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
7. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
8. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete.
 - a. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar.
 - b. Locate temporary openings in forms at inconspicuous locations.
9. Chamfer exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

C. Provisions for Other Trades:

1. Provide openings in concrete formwork to accommodate work of other trades.
 - a. See "Coordination With Other Trades" in Part 1 of this Section.
2. Size and location of openings, recesses, and chases from trades shall be as indicated on the Structural Engineer approved Coordination Drawings.
3. Accurately place and securely support items built into forms.
4. Comply with tolerances required by other trades and equipment manufacturer's requirements for tolerances of formwork, sleeves and embedded items.

D. Form Cleaning and Tightening:

1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.4 VAPOR RETARDER INSTALLATION

- A. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.
 - 2. Repair any damaged areas in vapor barrier.
 - 3. Seal around penetrations and openings as shown on the Drawings.
 - a. Verify seal methods and materials are in compliance with vapor barrier manufacturer's written recommendations.

3.5 REINFORCEMENT

- A. Fabrication of Reinforcement: Reinforcement shall be accurately formed to dimensions on the approved shop drawings, details and schedules.
- B. Fabrication shall not commence until shop drawings, details, and schedules have been approved by the Structural Engineer.
- C. Reinforcement shall be bent cold and shall not be heated for any purpose.
- D. Bars shall not be formed in a manner injurious to the bars. Bars with kinks or bends not shown on the Drawings and bars reduced in section will be rejected.
- E. Reinforcement of ASTM A 615 grade shall not be welded.
- F. Placing Reinforcement:
 - 1. Reinforcing shall be accurately placed and rigidly secured in position in accordance with the CRSI requirements for Recommended Practice for Placing Reinforcing Bars and Recommended Practice for Placing Bar Supports and with further requirements specified herein and on the Drawings.
 - 2. Tie reinforcing with annealed #18 gauge (min.) wire, and bend all wire back beyond general plane of reinforcing.
 - 3. Spacing: Minimum clear distances between parallel bars shall be equal to nominal diameter of bars. Clear spacing, in no case, shall be less than one-inch or 1-1/3 times maximum size of coarse aggregate.
 - 4. Avoid cutting or puncturing vapor retarder during reinforcement placement.
 - 5. Welded Wire Reinforcement in slabs shall be continuous, shall have joints lapped at least one full mesh, but not less than 6" and shall be supported at proper elevations by accessories.
 - a. Stagger laps of sheets to avoid continuous lap in either direction.
 - b. Provide support bars to maintain the fabric in its proper position during the placing of the concrete.
 - 6. Bending, tack welding, cutting or substituting reinforcement in the field, other than shown on the Contract Drawings, in any manner is prohibited, unless specific written approval for each case is given by the Structural Engineer.

7. At the time the concrete is placed, all reinforcement shall be free from excessive rust scale, or other coatings which might destroy or reduce the bond.
8. Avoid exposure of reinforcement to the weather for any considerable length of time before placing of concrete. The Contractor shall be responsible for protecting exposed concrete and any other materials against staining from exposed reinforcement.
9. Reinforcement shall be spliced only as shown on the Drawings or approved by the Structural Engineer.
10. Mechanical splicing shall be done in accordance with manufacturer's instructions. Manufacturer shall provide competent technical staff at the job site to demonstrate and instruct in the use of the splicing process and to assist in solving field problems.

3.6 JOINTS

A. Construction Joints:

1. Locate and install construction joints as indicated.
2. If joints are not indicated, locate at 1/4 to 1/3 points of spans and so as not to impair strength and appearance of the structure.
 - a. For exposed to view areas submit proposed locations to Structural Engineer.
 - b. Structural Engineer's written approval is required before placing concrete.
3. Provide keyways at least 1-1/2 inches deep in construction joints in walls and between walls and footings.
4. Place construction joints perpendicular to main reinforcement.

B. Waterstops:

1. Provide waterstops in construction joints as indicated.
 - a. Install waterstops to form continuous diaphragm in each joint.
 - b. Make provisions to support and protect exposed waterstops during progress of work.
 - c. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions.

C. Isolation Joints in Slabs-on-Ground:

1. Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, and elsewhere as indicated.
 - a. Pre-formed isolation joint material shall be held down to accommodate isolation joint sealant. 2:1 width to depth ratio shall be provided or in accordance with manufacturer's written instructions.

D. Contraction (Control) Joints in Slabs-on-Ground:

1. Construct control joints in slabs-on-ground to form panels of patterns as shown.
 - a. Use saw cuts 1/8 inch wide by 1/4 slab depth.
 - b. Saw cut as soon as possible after slab finishing as may be safely done without dislodging aggregate.

3.7 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete.
- B. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- C. The installation of all inserts required by other trades shall be coordinated with, or shall be installed prior to, the placing of reinforcing steel.
- D. Install anchor bolts, embeds, etc., furnished by other Sections. Set accurately and secure to prevent displacement.
- E. Embedded Conduit:
 - 1. Embed no pipes or electrical conduit in any structural concrete.
 - 2. Provide sleeves for pipes passing through concrete.
- F. Reglets:
 - 1. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

3.8 FORMS FOR SLABS

- A. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.9 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with an approved form-coating compound before reinforcement is placed.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.
- D. Remove water, dirt, debris, saw dust, and foreign substances from form surfaces prior to placing concrete.

3.10 PREPARATION OF CONCRETE PLACEMENT

- A. Prior to placing concrete verify that work for Division 3 and other trades in the area of proposed concrete placement are completed.

B. Contractor's Inspection Before Placing Concrete:

1. Concrete on formwork. Verify:
 - a. Removal of debris, dust, saw dust, and foreign substances.
 - b. Completeness of:
 - 1) Formwork.
 - 2) Reinforcing.
 - 3) Items to be embedded.
 - c. Reinforcing was not damaged nor dislodged by work of other trades.
 - d. Reinforcing has the proper cover.
 - e. Removal of water.
2. Slab-on-grade with vapor barrier. Verify:
 - a. Removal of moisture.
 - b. Removal of debris and foreign substances.
 - c. Reinforcing to be complete and not damaged by work of other trades.
 - d. Repair of defects in vapor barrier.
 - e. Sealing around penetrations and openings in vapor barrier.
 - f. Sealing at termination of vapor barrier.

C. Independent Testing Agency's Inspection:

1. Inspect designated areas to receive concrete in accordance with requirements from Specification Division 01 and Drawings.
2. Re-inspect areas not previously accepted.

D. Contractor/Testing Agency Coordination:

1. Prior to placing concrete the Contractor shall verify that:
 - a. The required inspections are completed.
 - b. Any remedial work required and accepted by the Independent Inspection Agency is completed and accepted by the Independent Inspection Agency.

3.11 CONCRETE PLACEMENT

A. General:

1. Concreting shall not be continued when the air temperature is below 45 degrees F. unless the aggregates and/or water are heated to produce a placing temperature of the concrete between 60 degrees F. and 90 degrees F. and unless adequate provisions are in place for maintaining protection against freezing of the concrete for at least 7 days after placing.
2. No concrete shall be placed on frozen subgrade.
3. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
4. Addition of water after the batch will not be permitted.

- a. Increase slump for workability by adding water reducing admixtures.
 5. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness.
 - a. If a section cannot be placed continuously, provide construction joints as herein specified.
 6. Deposit concrete to avoid segregation at its final location.
 7. Concrete shall be deposited with a minimum of rehandling and shall be spaded adjacent to forms and joints.
 8. Place concrete simultaneously against both sides of the isolation joints.
- B. Placing Concrete in Forms:
1. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 2. Place concrete to avoid segregation of aggregates, and as close to the final location as possible. Avoid horizontal movement of concrete.
 3. Do not shovel spilled concrete back into buckets or hoppers for subsequent use.
 4. Concrete shall have an unrestricted free vertical drop. The stream of concrete shall not fall over reinforcing, ties or embedded items.
 - a. Use a tremie or chute if reinforcement is constricted enough to prevent the concrete free vertical drop.
 5. Tremies or chutes shall have a diameter of at least 8 times the maximum aggregate size for the top 6 to 8 feet and may be tapered to at least 6 times the maximum aggregate size.
 6. Remove loose, dried mortar or concrete paste from embedded items and reinforcing if placement involved multiple placements with a horizontal contraction joint.
 7. Consolidation: Consolidate concrete by mechanical vibrating equipment supplemented by hand spading, rodding or tamping.
 - a. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 - b. Immediately after depositing concrete, spade next to forms, work around reinforcement and into angles of forms.
 - c. Compact concrete with mechanical vibrator applied directly into concrete at approximately 1-1/2 foot intervals.
 - d. Mechanical vibrator shall be power driven, hand operated type (with minimum frequency of 5,000 cycles per minute) having an intensity sufficient to cause flow or settlement of concrete into place.
 - e. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and concrete of uniform and maximum density without segregation of mix.
 8. Vibrating concrete:
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine.

- c. Place vibrators to rapidly penetrate placed layer and at least 6 inches into immediately preceding layer.
- d. Do not insert vibrators into lower layers of concrete that have begun to set.
- e. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

C. Placing Concrete Slabs:

1. Do not place concrete on surfaces containing water.
2. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
4. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
5. If buggies are used, runways shall be planked.
6. Maintain reinforcing in proper position during concrete placement.
 - a. Do not damage nor dislocate reinforcing (bars and WWF, either one or both) during concrete placement.

D. Cold-Weather Placing:

1. Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Only use a specified accelerator.

E. Hot-Weather Placing:

1. Hot weather conditions are a product of some or all of the following:
 - a. Temperature.
 - b. Humidity.
 - c. Wind-speed.
2. Use hot-weather applications when rate of evaporation approaches 0.2 lb/ft² or sq. ft./hour for standard Portland cement mix.
 - a. Use ACI 305R Figure 2.1.5 to calculate the rate of evaporation (attached).
 - b. Concrete mixes containing ultra-fine pozzolans or other cementitious materials are governed by a lower evaporation rate. See ACI 305, Section 2.1.4 thru 2.1.6.
3. When hot weather conditions exist that would impair quality and strength of concrete, place concrete in compliance with ACI 305R and as herein specified.

4. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
5. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
6. Fog spray forms, reinforcing steel, and subgrade without vapor barrier just before concrete is placed.
7. Use water-reducing retarding admixture when required by one or more of the following:
 - a. high temperatures,
 - b. low humidity,
 - c. wind
 - d. other adverse placing conditions.

3.12 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. Repair and patch defective areas. Chip off or rub down fins and other projections exceeding 1/4 inch in height.

B. Smooth Form Finish:

1. For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Related Unformed Surfaces:

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

3.13 MONOLITHIC SLAB FINISHES

A. Floor Flatness/Levelness Tolerances: F Number system:

1. Slabs on grade to be polished/stained shall conform to ACI 117 floor levelness (F_L) and flatness (F_F) numbers.
2. F_F defines the maximum floor curvature (waviness). Unless otherwise noted:
 - a. Slab $F_F = 50$; with a minimum local value of $F_F = 35$.
3. F_L defines the relative conformity of the floor surface to a horizontal plane.
 - a. Slab $F_L = 30$; with a minimum local value of $F_L = 20$.

4. Report all defective areas to Contractor and Architect within 24 hours after measuring.
- B. Measurements for Flatness/Levelness:
1. Slabs shall be measured in accordance with ASTM E-1155 "Standard Test Method for determining floor flatness and levelness using the "F- number" system (inch-pound units).
 - a. Measurements shall be performed within 72 hours after placement.
 - b. On floors with more than one concrete placement for slabs, each placement shall meet the minimum FF and FL specified and local values.
 - 1) Using several placements to average values is not permitted.
- C. Floor Finish: Straight Edge Method
1. Finish surface in such fashion that the gap at any point between the concrete surface and a 10-foot long straightedge placed at a true horizontal plane, resting on the high- spot and placed anywhere on the surface does not exceed $\frac{1}{4}$ inch.
 2. Measure surface within 72 hours of concrete placement.
 3. Report all defective areas to Contractor and Structural Engineer within 24 hours after measuring.
- D. Scratch Finish:
1. Apply scratch finish to monolithic slab surfaces to receive composite concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
 2. After placing slabs,
 - a. plane surface to tolerances of:
 - 1) $\frac{1}{2}$ " in 10 feet for floor for un-shored construction.
 - 2) Floor flatness (FF) of 15 and floor levelness (FL) of 13 for shored construction.
 - b. Slope surfaces uniformly to drains where required.
 - c. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- E. Float Finish:
1. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with
 - a. resilient flooring, carpeting
 - b. ceramic or quarry tile.
 - c. membrane or elastic waterproofing, membrane or elastic roofing,
 - d. concrete floor topping
 - e. sand-bed terrazzo
 - f. or thin-set
 - g. as otherwise indicated.
 2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has

disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.

- a. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.
- b. Refer to ACI 302.1R-04 for finishing requirements.
- c. Check and level surface plane to specified tolerances.
 - 1) Cut down high spots and fill low spots.
- d. Uniformly slope surfaces to drains.
- e. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

F. Trowel Finish:

1. Apply trowel finish to only monolithic slab surfaces to be exposed to view, covered with paint, or other thin film finish coating system.
2. After floating, begin first trowel finish operation using a power-driven trowel.
 - a. Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 - b. Consolidate concrete surface by final hand-troweling operation.
 - c. Refer to ACI 302.1R-04 for finishing requirements.
 - d. Produce surface free of trowel marks, uniform in texture and appearance, and with surface leveled to specified tolerances.
 - e. Grind smooth surface defects that would telegraph through applied floor covering system.

G. Trowel and Fine Broom Finish:

1. Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

H. Nonslip Broom Finish:

1. Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
2. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Structural Engineer before application.

3.14 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and against injury from heat, cold and defacement of any nature during construction operations. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations.
2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 7 days.

- a. Concrete, particularly exposed surfaces, shall be treated immediately after concreting or finishing is completed to provide continuous moist curing regardless of ambient air temperatures.
 - b. Have on the site, ready for use, sufficient and adequate equipment for protecting the concrete from any and all forms of damage by the elements, including equipment for enclosing, heating, and shading the concrete.
 - c. Note: The purpose of moist curing is to continuously provide additional available water to the concrete to permit hydration of cement. Periodic sprinkling is not effective in curing, and will not be accepted as meeting curing requirements.
3. Curing shall be in accordance with ACI 301 procedures.
 - a. Avoid rapid drying at end of final curing period.
- B. Curing Methods:
1. General:
 - a. Slabs to receive another finish or floor covering are limited to:
 - 1) Moist curing.
 - 2) Moisture-retaining cover curing.
 - 3) Curing with dissipating curing compound.
 - b. Slabs to be polished/stained are limited to:
 - 1) Moisture retaining cover curing.
 2. Perform curing of concrete by one of the following methods:
 - a. Moist curing.
 - b. Moisture-retaining cover curing.
 - c. Combinations moist curing and moisture-retaining cover curing.
 - d. Application of a dissipating curing compound.
 - e. Application of liquid membrane forming curing compound.
 3. Restrictions:
 - a. Do not use membrane forming curing compound for slabs to receive another finish or floor covering unless the compatibility of floor finishes with specific curing compound is verified by the Contractor in writing.
 - 1) Use water based compound if required by local ordinances.
 4. Provide moisture curing by following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Use continuous water-fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet.

- 1) Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
5. Provide moisture-retaining cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - b. During application do not drag covers over the finished concrete not covered. Take precautions to prevent the covers from being displaced. If it is necessary to remove a cover for any reason, so not expose the concrete slab for more than 1/2 hr. Do not stain the newly finished slab.
6. Provide liquid membrane forming curing compounds to slabs as follows:
 - a. Exposed interior slabs not receiving another finish.
 - 1) Apply specified liquid membrane forming curing compounds to concrete flat-work as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared).
 - a) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions.
 - b) Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - c) Maintain continuity of coating and repair damage during curing period.
 - d) Apply second approximately 24 hours after applying first coat.
7. Provide dissipating curing compound to interior slabs as follows:
 - a. Apply specified dissipating curing compound to concrete slab as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared).
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions
 - 2) Recoat areas subjected to rainfall within 3 hours after initial application.
 - 3) Maintain continuity of coating and repair damage during curing period.

C. Curing Formed Surfaces:

1. Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
2. After forms are stripped, wet down all column and wall surfaces thoroughly and cover with insulating blankets during cold weather and quilted covers, cotton mats or other approved covers at other times so that the concrete is kept continuously wet and at minimum temperature of 50 degrees F for 7 days (or for 350 day degrees) after it is placed.
3. Forms may be kept in place to effect curing.
 - a. Absorbent wood forms shall be kept continuously wet while in-place.
4. If forms are removed, continue curing by methods specified above, as applicable.

- a. Exception: Where formed surfaces do not receive the application of another finish material, sealer products may be used.

D. Curing Unformed Surfaces:

1. Unformed surfaces such as floors and tops of columns, walls, etc., shall be moist cured at a minimum temperature of 50 degrees F. for seven days (or for 350 day degrees) as follows:
 - a. If the concrete shows any signs of drying out before it is hard enough to allow ponding or covering without marring the finish, immediately provide a fog spray of water over the floor surface until the concrete can be ponded or covered.
2. Unformed surfaces, such as slabs and other flat surfaces may be cured by application of appropriate membrane forming curing compound only upon approval by Structural Engineer of Contractor's submittal of curing compound compatibility with finishes.

3.15 TEMPERATURE RECORDS:

- A. Keep a permanent record showing the date and the outside and concrete temperatures for all concreting operations (including curing). Take thermometer readings at the start of work in the morning, at noon, and again late in the afternoon. Record the location of all concrete placed and cured during such periods, all in such a manner as to show any effect the temperature may have had on the construction.

3.16 COLD WEATHER PROTECTION:

- A. When the air temperature is at or below 40 degrees F. or when weather reports indicate that the temperature may fall below 40 degrees F., within the 24 hr. period following placement of concrete, take all adequate and proper measures as required to maintain the temperature of the concrete between 50 degrees F. and 70 degrees F. for the specified curing period and to protect the concrete against damage by freezing or the cold, including but not limited to the following:
 1. Foundation concrete may be cured by balanced backfill on all sides to a minimum depth of 18" for average temperatures over 32 degrees F. Cure and protect exposed foundation surfaces as specified herein.
 2. Ascertain that the requirements for heating of aggregates and water have been followed.
 3. Heat formwork, reinforcing and underlying subgrades with live saturated steam so as to raise the temperature well above the freezing point. Concrete surfaces shall be covered to prevent direct contact with the steam.
 4. After placing of concrete, protect against cold by means of tight covering and supply of sufficient heat, where required, to maintain the concrete at a temperature of 50 to 70 degrees F. for at least 7 days after placement of concrete or for at least 3 days if air entrained concrete is used. The concrete shall not be protected with salt, hay, manure, or any other material containing live or organic acids. Concrete shall be kept continually moist during the curing periods.
 5. The section to be concreted shall be completely housed or enclosed wherever practicable before placing of concrete, in a manner that will insure the maintenance of the required temperatures. Such enclosures shall be left in place for the curing period.
 6. High early strength cement may not be used unless specifically approved by the Structural Engineer.

7. Accelerating admixtures may be used, provided they meet the specified non-corrosive, non-chloride requirements.
8. Except as modified above, follow procedures as outlined in ACI 306.

3.17 HOT WEATHER PROTECTION:

- A. Take special care during the concreting operations during hot or dry weather. Wet forms just before placing of concrete and keep exposed surface continually damp. Take special precautions in placing of slabs in unshaded locations so as to prevent flash setting of concrete. Provide a continuous fog spray of water immediately after screeding and maintain in moist condition and take such other protective measures as required to prevent damage from flash setting of concrete. Do not use retardant admixtures, other than the specified water reducing agent, without specific approval of the Structural Engineer. Except as modified above, follow procedures as outlined in ACI 305.

3.18 PROTECTION OF FLOORS

- A. Protect floors, both treated and untreated, from damage and wear until the remainder of the construction period.
 1. Use protective methods and materials, including but not limited to temporary covering.
 2. For floors that have received treatment, coordinate protection method with floor-treatment-manufacturer and installer.
 - a. Receive written approval of proposed method from both, manufacturer and installer.
 - b. Installer's recommendations shall in no case be less than those of the manufacturer.

3.19 CLEANING

- A. Slabs:
 1. Concrete slabs and steps not receiving additional finishes should be thoroughly cleaned by scrubbing with a good detergent or vegetable oil soap.
 2. Concrete slabs cured with "dissipating curing compound" shall be cleaned as follows:
 - a. Where permitted by floor covering manufacturer, scrub the floor with dissipating curing compound cleaner and stiff bristle, then rinse well with clean water.
 - b. Where dissipating curing compound cleaner is not acceptable to floor covering manufacturer, use mechanical equipment to remove dissipating curing compound.
 - c. After proper clean-up, follow the written requirements of the covering manufacturer for the recommended surface preparation for the particular covering product to be applied.

3.20 REMOVAL OF FORMS

- A. Remove forms only after concrete has attained sufficient strength to support its own weight, construction live loads thereon, and lateral loads, all without excessive deflection or damage to the structure. See ACI 347 "Recommended Practice for Concrete Formwork" for detailed discussion of form removal.

- B. If high early strength cement is approved by the Structural Engineer, minimum times for curing, protection and form removal will be reduced per strength gain tests as approved by the Structural Engineer.
- C. Verification of in-place concrete strengths shall be through an in situ, non-destructive method, unless minimum day degrees are exceeded by 25%, and cylinder tests verify required strength.
- D. Verification of day degrees shall be through a surface or an embedded thermometer and under the weather enclosure when the temperature falls below 50 degrees F.

3.21 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged and patched form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for continuous concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets.

3.22 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
 - 1. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.23 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas:
 - 1. When acceptable to Structural Engineer repair and patch defective areas with cement mortar immediately after removal of forms.
 - 2. Cut out honeycomb, rock pockets, voids over 1 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 3/4 inch. Make edges of cuts square and perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching or patching concrete mortar before bonding compound has dried. Cure in same manner as adjacent concrete.
 - 3. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces:
 - 1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Structural Engineer.

2. Surface defects as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
 3. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
 4. Repair concealed formed surfaces that contain defects that affect the durability of concrete.
- C. Repair of Unformed Surfaces (Flatwork):
1. Test flatwork for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
 2. Repair finished flatwork that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
 3. Correct high areas in flatwork by grinding after concrete has cured at least 14 days.
 4. Correct low areas by either cutting out low areas or by filling-in with specified self-leveling compound.
 - a. The option of replacing or repairing is at the discretion of the Structural Engineer.
 - b. Cutting out and slab replacement.
 - 1) For areas not receiving another finish, provide repair to blend into adjacent concrete.
 - c. Filling-In:
 - 1) Use specified self-leveling compound.
 - 2) Prepare surfaces and apply primer as required in manufacturer's written instructions.
 - a) Do not scarify slabs.
 - 3) For slab areas not receiving another finish, provide repair to blend into adjacent concrete.
 - 4) Cure and protect as required in manufacturer's written instruction.
 5. Repair isolated random cracks by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 6. Place dry-pack before bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- D. Perform structural repairs with prior written approval of Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.
- E. Repair methods not specified above may be used, subject to written acceptance of Structural Engineer.

3.24 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Testing Agency:

1. Refer to Division 1 Section "Quality Control - General" for Contractor's and Independent Testing Agency's administrative requirements.

B. Quality Control and Testing:

1. Refer to Drawings and Division 1 Section(s) "Quality Control - General" and "Testing and Inspection Services - Building" for requirements.

3.25 ACCEPTANCE OF COMPLETED WORK

A. Those portions of the structure that do not meet the Contract requirements based on appearance or for any other aesthetic reason shall be corrected or removed and replaced as directed by the Structural Engineer or Owner and all costs of corrections, removal and replacement, shall be at the Contractor's expense.

1. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
2. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength (f_c'), and no individual strength test result falls below specified compressive strength by more than 500 psi when f_c' is 5000 psi or less.
3. If any strength test of laboratory cured cylinders fall below the required strength level, or if observations or other evidence indicates deficiencies in protection or in curing, or if the concrete is suspected of having been frozen, steps shall be taken to assure that load carrying capacity of the structure is not jeopardized.
4. If, in the judgment of the Structural Engineer based on data from test-cylinders, and in-situ concrete cores, the ultimate load carrying capacity or durability has been significantly reduced, the concrete shall be removed and replaced at the Contractor's expense.
 - a. Core-drilling may only be undertaken with Structural Engineer's review and approved comments to the Contractor's proposed scope (extend and number of cores).
 - b. Non-destructive concrete evaluation procedures such as swiss hammer, windsor probe, etc. are not acceptable as a tool to determine the in-situ strength of concrete.

END OF SECTION 033000

SECTION 034100 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes precast hollow core plank.

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. Design Mixtures: For each precast concrete mixture.
- C. Shop Drawings:
 - 1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
 - 2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer in the State of Michigan responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Welding certificates.
- C. Material certificates.
- D. Material Test Reports: For aggregates.
- E. Source quality-control reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.6 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design precast structural concrete units.
- B. Design Standards: Comply with ACI 318 (ACI 318M) and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- C. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, assembled with clips.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel or galvanized-steel wire into flat sheets.
- E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M or ASTM A 1064/A 1064M, flat sheet.
- F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.3 PRESTRESSING TENDONS

- A. Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, seven-wire, low-relaxation strand.
 - 1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.7 and sheath with polypropylene tendon sheathing complying with ACI 423.7. Include anchorage devices and coupler assemblies.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Metakaolin: ASTM C 618, Class N.
 - 3. Silica Fume: ASTM C 1240, with optional chemical and physical requirement.

4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
5. Blended Hydraulic Cement: ASTM C 595/C 595M.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M with coarse aggregates. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.5 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.
- D. Malleable-Iron Castings: ASTM A 47/A 47M, Grade 32510 or Grade 35028.
- E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).
- F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- G. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).
- H. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.
- I. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.
- J. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M) or ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 (ASTM A 563M); and hardened carbon-steel washers, ASTM F 436 (ASTM F 436M).
 1. Do not zinc coat ASTM A 490 (ASTM A 490M) bolts.
- K. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
- L. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.

2.6 BEARING PADS

- A. Provide bearing pads for precast structural concrete units as recommended by precast fabricator for application.

2.7 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.
- B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.
- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.8 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: Limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.9 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.

- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
- J. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
- K. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.
- L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.
- M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.10 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.11 COMMERCIAL FINISHES

- A. Commercial Grade: Remove fins and protrusions larger than 1/8 inch (3 mm) and fill holes larger than 1/2 inch (13 mm). Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch (5 mm).
- B. Apply roughened surface finish according to ACI 318 (ACI 318M) to precast concrete units that receive concrete topping after installation.

2.12 SOURCE QUALITY CONTROL

- A. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 2. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 3. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
- D. Field cutting of precast units is not permitted without approval of Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
- H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

3.2 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.3 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.
- B. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.
- C. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- D. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.4 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's or Masonry Block).
2. Face brick.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
2. Division 07 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints.
3. See Division 07 Section "Building Insulation" for cavity wall insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

C. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

D. Material Certificates: For each type and size of product indicated. For masonry units include material test reports substantiating compliance with requirements.

E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.3 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.4 MOCK-UP

- A. Construct a multi-wythe masonry wall as a mock-up panel sized 8 feet long by 6 feet high, which includes mortar and accessories (cell vents, expansion joints, horizontal reinforcement, etc.), wall openings, flashings, dampproofing wall insulation, pea gravel, masonry block, cast stone and brick veneer.
- B. Locate where directed.
- C. Mock-up will remain until project completion and will be used as a basis for quality control.
- D. Mock-up must be complete and in place and reviewed / accepted by the Architect, prior to beginning any masonry work.
- E. Remove and discard mock-up when directed by Architect.

1.5 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS (MASONRY BLOCK)

- A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Concrete Masonry Units: ASTM C 90.
 - 1. Available products:
 - a. Grand Blanc Cement Products; 800-875-7500.
 - b. National Block Company ; 734-721-4056

- c. Best Block Company;
 2. Size: Nominal face dimension of 8" x 16" and nominal depth as indicated on drawing.
 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi (13.1 MPa).
 4. Weight Classification: Normal weight.
 5. Both hollow and solid block as indicated.
 6. Exposed corners (including door jambs) to be radius profile typical unless otherwise noted.
- C. Burnished Concrete Masonry Units: ASTM C90
1. Basis of Design: Grand Blanc Cement Products (800.875.7500):
 2. GFM-#1, GFM-#2, GFM-#3:
 - a. Refer to 'Material Finish / Color Schedule Section 000200' for color selections.
 - a. Units shall be integrally colored and furnished with a factory applied sealer coat.
 - b. Units shall have (1) one field sprayed applied seal coat of 'TK-Bright Kure & Seal-1315' Curing and sealing Compound as provided by TK Products and finish after application must be approved by architect.
 - 1). Nominal face dimension of 8" x 16" and nominal depth of 4" or 8" (as indicated on drawings), with straight through cavities able to accommodate reinforcing steel.
- D. Integral Water Repellent: For exterior units, provide units made with liquid polymeric, integral water repellent admixture that does not reduce flexural bond strength for exposed units.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries; RainBloc.
 - b. BASF Aktiengesellschaft; Rheopel Plus.
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.
- E. Fire Rating: Provide CMU with fire rating up to 2 hours as required to achieve fire ratings of wall assemblies.

2.4 MASONRY LINTELS

- F. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout.

2.5 BRICK (FB-1, FB-2)

- A. General: Provide shapes indicated and as follows:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Face Brick: Facing brick complying with ASTM C 216.
1. Basis of Design: Belden Brick Company
 2. Products: Subject to compliance with requirements, provide the following:

- a. FB-#1 and FB-#2: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.
3. Grade: SW.
4. Type: FBX.
5. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 22,000 psi.
6. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
7. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
8. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).
9. Size (Actual Dimensions): 3-5/8 inches wide by 2 1/4 inches high by 7-5/8 inches long.
10. Clay Brick shall not have continuous cracks on the bed face from the header face to the core, or from core to core. Brick shall be free of cracks that extend to a core.

2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Refer to 'Material Finish / Color Schedule Section 000200' for color selections.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Davis Colors.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. Lanxess Corporation.
 - d. Solomon Colors, Inc.
- F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 1. Colored Portland Cement-Lime Mix:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Argos USA LLC.
- 2) Holcim (US) Inc.
- 3) Lehigh Hanson; HeidelbergCement Group.

G. Preblended Dry Mortar Mix: Packaged blend made from portland cement and hydrated lime, sand, mortar pigments, water repellents, and admixtures and complying with ASTM C1714/C1714M.

1. Preblended Dry Portland Cement Mortar Mix:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Amerimix is a trademark of Bonsal American, an Oldcastle company.
- 2) Quikrete; The QUIKRETE Companies, LLC.
- 3) SPEC MIX, LLC.
- 4) Sakrete; CRH Americas, Oldcastle APG.

H. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Aggregate for Grout: ASTM C 404.

J. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

K. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Euclid Chemical Company (The); Accelguard 80.
- b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
- c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

L. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized steel.

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3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
7. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Heckmann Building Products, Inc.
 - b. Hohmann & Barnard, Inc.
 - c. Wire-Bond.
2. Install at 16" O.C., unless otherwise noted on drawings.

D. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Heckmann Building Products, Inc.
 - b. Hohmann & Barnard, Inc.
 - c. Wire-Bond.
2. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.
 - a. Size appropriately to accommodate cavity wall insulation thickness.
3. Install at 16" O.C., unless otherwise noted on drawings.

2.8 TIES AND ANCHORS

- A. General: Ties and anchors 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.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.

1. Wire: Fabricate from 3/16-inch diameter, hot-dip galvanized steel wire.
- D. 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- (6.35-mm-) diameter, hot-dip galvanized steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, 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 (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
 2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- (1.90-mm-) thick steel sheet, galvanized after fabrication.
 3. Fabricate wire ties from 0.187-inch- (4.76-mm) diameter, hot-dip galvanized-steel wire unless otherwise indicated.
 4. Screw-Attached, Masonry-Veneer Anchors at Brick veneer: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Wire-Bond; "2401 RJ-711 Adjustable Veneer Anchor" or comparable product by one of the following:
 - 1) FERO Corporation.
 - 2) Hohmann & Barnard, Inc.
 5. Screw-Attached, Masonry-Veneer Anchors at CMU Veneer: Seismic anchor comprised of a plate with leg and a heavy duty seismic adjustable anchor (#2422). The seismic anchor is notched to accept 9 gauge or 3/16" continuous wire.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Wire-Bond; "2422 RJ-721 Adjustable Veneer Anchor" or comparable product by one of the following:
 - 1) FERO Corporation.
 - 2) Hohmann & Barnard, Inc.
- F. Partition Top anchors: 0.105-inch- (2.66-mm-) thick metal plate with 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- H. Rebar Positioners: Provide horizontal and vertical rebar positioners:

1. Horizontal: Bond Beam Positioners as manufactured by Wirebond or approved equal.
 2. Vertical: Rebar Positioners as manufactured by Hoffman & Barnard or approved equal.
- I. Anchor Bolts: "Headed Type" steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.9 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel Drip Edges (Flat Plate): ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick. Extend at least 3 inches (75 mm) into wall end flush with face of masonry.
 - a. Provide at all through wall flashing locations 6'-0" above finish floor and below.
 - b. Basis of Design Product: Hohmann & Barnard "Flat Drip Plate Flush End with Foam Tite Seal" #FDP-FTS
 - 1) Provide with optional Foam-Tite Seal: 1/8" thick strip of factory-installed compressible foam to act as a bond-break and help prevent air and moisture infiltration.
 - 2) Corners of metal drip edges to be "pre-manufactured fully mitered corners" with no sharp edges.
 2. Stainless Steel Drip Edges: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch (0.40 mm) thick. Extend at least 3 inches (75 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
 - a. Provide at all through wall flashing locations higher than 6'-0" above finish floor.
 - b. Basis of Design Product: Hohmann & Barnard "Standard Drip Plate with Foam Tite Seal" #DP-FTS
 - 1) Provide with optional Foam-Tite Seal: 1/8" thick strip of factory-installed compressible foam to act as a bond-break and help prevent air and moisture infiltration.
 - 2) Corners of metal drip edges to be "pre-manufactured fully mitered corners" with no sharp edges.
 3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
 4. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
- B. Single-Wythe CMU Pan Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans to have sloped design with integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar. Drainage mat and insect guard to be provided.
1. Basis of Design: BlockFlash by Mortar Net Solutions (800) 664.6638.

- A. Flexible Flashing: Use the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m), self-adhesive copper sheet bonded between two layers of Polyethelene film. Use only where flashing is fully concealed in masonry.
 - a. Basis of Design: Subject to compliance with requirements, provide Hohmann & Barnard, Inc. "Copper Fabric SA" or comparable products by one of the following:
 - 1) Advanced Building Products Inc.
 - 2) STS Coatings, Inc.
 - 3) Wire-Bond.
 - 4) York Manufacturing, Inc.
- B. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
- C. 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.
- D. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1 inch (3 mm by 25 mm).

2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use one of 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 (3 mm) less than depth of outer wythe, in color(s) selected by Architect from manufacturer's standards.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; Mortar Maze weep vent.
 - 2) Blok-Lok Limited; Cell-Vent.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
 - 4) Heckmann Building Products Inc.; No. 85 Cell Vent.
 - 5) Hohmann & Barnard, Inc.; Quadro-Vent.
 - 6) Wire-Bond; Cell Vent.

- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - 1. Mortar Deflector: Strips, full depth of cavity and 10 inches (254 mm) high, with dovetail-shaped notches that prevent clogging with mortar droppings.
 - 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) Advanced Building Products Inc.
 - 2) Hohmann & Barnard, Inc.
 - 3) Mortar Net Solutions.
 - 4) Wire-Bond.
 - 5) York Manufacturing, Inc.

2.11 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: Extruded-Polystyrene Board Insulation: As specified in Specification Section 072100 "Thermal Insulation".

2.12 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.
 - d. Or equal.

2.13 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. For exterior masonry, use portland cement-lime mortar.
 - 4. For reinforced masonry, use portland cement-lime mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. 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. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, interior and exterior bearing walls, use Type S.
 - 3. For mortar parge coats, use Type S.
 - 4. For interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 5. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- 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 pigment-to-cement ratio as recommended by manufacturer to maintain specified properties.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.
- F. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- D. Layout and install screw-attached masonry veneer anchors prior to installation of fluid applied membrane air barrier.

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 (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. MOCK-UP WALL

1. Construct mock-up wall immediately upon approval of materials. Mock-up must be completed and accepted by Architect prior to commencement of masonry work.

C. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

D. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

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 (100-mm) horizontal face dimensions at corners or jambs.

- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

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

3.5 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using one of the following methods:
 - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
- B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide individual metal ties not more than 16 inches (406 mm) o.c.
 - 2. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
 - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Coat cavity face of backup wythe to comply with Division 07 Section "Bituminous Dampproofing."
 - 1. Dampproofing to extend from face of footing up backup wythe to underside of thru wall flashing.
- D. Apply air barrier to face of backup wythe to comply with Division 07 Section "Fluid-Applied Membrane Air Barriers."
- E. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.7 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
 - 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1 inch (25 mm) 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 (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Embed connector sections and continuous wire in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.
 4. Locate 1/4" diameter 7" x 7" hot-dip galvanized dovetail triangle tie located 24" o.c. horizontally at locations of all soldier course brick veneer with hammer-screw fastener into masonry block.
 5. Install screw-attached anchors prior to fluid-applied membrane air barrier installation.

3.10 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products to form weep holes.
 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
 3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
- D. Place pea is base of cavities. Pea gravel to be 3" deep.

- 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.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.13 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. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 3. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Excess Masonry Waste: Remove excess masonry waste and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 047000 - MANUFACTURED MASONRY

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured thin brick masonry.
2. Accessories(trim).
3. Installation materials.

B. Related Requirements:

1. Section 042000 - Unit Masonry.
2. Section 047200 – Cast Stone.
3. Section 072726 Field Fluid Applied Membrane Air Barrier
4. Section 076200 - Sheet Metal Flashing and Trim.

1.2 REFERENCE STANDARDS

- AC308— ICC-ES Acceptance Criteria for Water Resistive Barriers
- ANSI Accredited Evaluation Service
- International Building Code(IBC)
- ANSI—American National Standards Institute
 - ANSIA118.1— American National Standards Institute Specifications for Dry-Set Portland Cement Mortar
 - ANSIA118.4— American National Standards Institute Specifications for Modified Dry-Set Cement Mortars
 - ANSIA118.15— American National Standards Institute Specifications for Improved Modified Dry-Set Cement Mortar
- TMS 402 — Building Code Requirements for Masonry Structures (TMS 402/ACI 530/ASCE 5).
- TMS 602— Specification for Masonry Structures (TMS 602/ACI 530.1/ASCE 6)
- ASTM International
 - ASTM C270— Standard Specification for Mortar for Unit Masonry
 - ASTM C847 — Standard Specification for Metal Lath
 - ASTM C1384 – Standard Specification for Admixtures for Masonry Mortars
 - ASTM C1670 – Standard Specification for Adhered Manufactured Stone Masonry Veneer Units
 - ASTM C1714/C1714M – Standard Specification for Preblended Dry Mortar Mix for Unit Masonry
 - ASTM C1780 – Standard Practice for Installation Methods for Adhered Manufactured Stone Masonry Veneer

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of manufactured thin brick and masonry with work of other sections.
- B. Preinstallation Conference: Conduct conference at Project site to verify Project requirements, manufacturers installation instructions, and manufacturer's warranty requirements.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with manufactured masonry installer, manufactured masonry manufacturer's technical representative, and installers whose work interfaces with or affects manufactured masonry work.
 - 2. Review construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to manufactured masonry installation, including manufacturer's written instructions.
 - 4. Review back-up construction including planar conditions, and other surface irregularities, if any.
 - 5. Review flashings, special details, wall penetrations, openings, and condition of other construction that may affect proper installation of manufactured masonry.
 - 6. Review temporary protection requirements for manufactured masonry during and after installation.
- D. Sequencing: Comply with written recommendations of masonry materials manufacturer for sequencing of construction operations.

1.4 ACTION SUBMITTALS

- A. General: Submit the following in accordance with Section 013300 - Submittal Procedures:
- B. Product Data: Materials description and installation instructions for each product specified.
- C. Samples:
 - 1. Masonry Units:
 - a. Two (2) pieces of each manufactured masonry unit including accessories and trim, full size, in each style and color specified.
 - 2. Other Samples:
 - a. Lath: One 12-inch (305-mm) square or larger piece of lath specified.
 - b. Grout: Full range of exposed color and texture; furnish 2 grout keys in each color selected.

1.5 INFORMATIONAL SUBMITTALS

- A. General: Submit the following in accordance with Section 013300 - Submittal Procedures:
 - 1. Certificates: Product certificates signed by manufacturer, certifying materials comply with specified criteria, performance characteristics, and physical requirements.
 - 2. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 3. Other Reports: Manufacturer's current ICC-ES Evaluation Report.

4. Manufacturer's Instructions: Manufacturers installation and mixing instructions for mortar and grout.
5. Letters of Verification:
 - a. Installers qualifications.

1.6 CLOSEOUT SUBMITTALS

- A. General: Submit the following in accordance with Section 017700 - Closeout Procedures:
 1. Operation and Maintenance Data: Submit Operation and Maintenance data for installed products.
 - a. Include: Manufacturer's instructions covering maintenance requirements.
 2. Warranty Documentation: Submit warranty documents specified.

1.7 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer Qualifications:
 - a. A firm regularly involved with the manufacture of simulated masonry products, with not less than 10 years of successful experience producing manufactured masonry units similar to those specified.
 - b. Manufacturer must be capable of providing field service representation during construction.
 2. Installer Qualifications: A firm with not less than 5 years of successful experience in performing work of this Section with crews specializing in the installation of work similar to that required for this Project.
- B. Source Limitations for Color Pigments: Obtain color pigments used in the manufacturing of masonry units and for mortar from a single manufacturer.
- C. Mock-Up: Construct mock-up where directed by Architect in accordance with Section 014500 Quality Control.
 1. Construct panel showing finished product installation work.
 2. Dimensions and Process: Construct panel 4 feet by 4 feet (1.2 m by 1.2 m) using proposed procedures, unit sizes, colors, textures, bond, mortar, and quality of workmanship.
 3. Purpose: To judge quality of work, substrate preparation and material application.
 4. When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 5. Do not proceed with work prior to receipt of written acceptance of mock-up by Architect.
 6. Do not destroy or move the panel until work is completed and accepted by Architect.
 7. Remove mock-up(s) at Substantial Completion or when requested by the Architect, and properly dispose of materials.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 1. Deliver materials in manufacturers original packaging with identification labels intact.
- B. Storage and Protection:
 1. Manufactured Masonry:

- a. Store products in manufacturer's unopened packaging until ready for installation.
 - b. Protect product from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.
 - c. Store product off-ground on material that will not stain manufactured units. Cover product with polyethylene or other non-staining waterproof material when storing long-term.
2. Other Materials:
- a. Properly store cementitious materials. Do not use damp cementitious materials.
 - b. Store installation materials, including metal items, to prevent corrosion and contamination.

1.9 PROJECT AMBIENT CONDITIONS

- A. Hot and Cold Weather Requirements: Comply with ACI 530.1.
1. Precondition materials when temperature of outside air is below 40 degrees F (4.4 degrees C).
 2. Do not use frozen materials or materials mixed or coated with ice or frost.
 3. Do not build on frozen substrates.
 4. In hot weather, protect masonry construction from direct exposure to wind and sun.
 5. Erect masonry in shade when ambient air temperature is 99 degrees F (37 degrees C) and relative humidity is less than 50 percent.

1.9 SPECIAL WARRANTY

- A. Manufacturer's Warranty:
1. The manufacturer warrants that the thin brick will be free of manufacturing defects in accordance with the General Conditions.
 - a. Defects include, but are not limited to:
 - 1) Inconsistent color or texture which differs from the product characteristics specified, those reviewed for acceptance and subsequently approved during the submittal process, and those approved as part of the Project mock-up.
 - b. Warranty does not extend to or cover damage resulting from:
 - 1) Settlement of building or other wall movement.
 - 2) Contact with chemicals, paint or staining.
 - 3) Discoloration from airborne contaminants, oxidation or fading associated with normal aging process.
 - 4) Faulty installation.
 - c. Warranty Period: manufacturer's standard warranty to become effective from the date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Products are based on materials as manufactured by Belden Brick Company (The), which is located at:

700 Tuscarawas Street W., Canton, OH 44702
Tel: 330-456-0031
Email:info@beldenbrick.com; Web:www.beldenbrick.com

2. Color and Style: Refer to Section 000200 Material Finish and Color Schedule.
3. Similar products meeting these specification requirements and manufactured by the following manufacturers may be acceptable upon approval of submitted samples:
 - a. Glen-Gery
 - b. Endicott
 - c. General Shale

2.2 MATERIALS

A. Manufactured Masonry Materials:

1. Masonry Sand: ASTM C144.
2. Portland Cement: ASTM C150, Types I, II, and III; white; blended by masonry manufacturer to meet stone mix requirements.
3. Lightweight Aggregate: ASTM C331, produced using rotary kiln process and refined in accordance with masonry manufacturer's requirements.
4. Masonry Pigment: ASTM C979, inorganic, natural or synthetic iron oxide pigments.

B. Installation Materials:

1. Mortar Materials (Field-Mixed):
 - a. Cement: ASTM C270.
 - b. Lime: ASTM C207.
 - c. Sand: ASTM C144, natural or manufactured sand.
2. Mortar Materials (Prepackaged):
 - a. Factory premixed mortar, complying with ASTM C270, Type S, colored, and with masonry manufacturer's installation instructions.
3. Mortar Pigment: ASTM C979, mineral oxide pigments.
 - a. Color: Selected by Architect from manufacturer's full range.
4. Water: Potable.
5. Expanded Metal Lath: ASTM C847 with ASTM A653/A653M, G60 (Z180, hot dip galvanized zinc coating).
 - a. Diamond Mesh Lath: Self furring, 3.4 lb/sq. yd. (1.8 kg/sq.
6. Water-Resistive Barrier: Sheet material(s) complying with and defined in ICC-ES AC308 as a water-resistive barrier.
 - a. Two layers of asphalt-saturated, nonperforated felt complying with ASTM D226, Type I (No. 15)
7. Casing Beads and Weeps:

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- a. General: Fabricated from hot dip galvanized steel sheet, ASTM A653/A653M, G60 (Z180) zinc coating.
- b. Casing Bead: Prefabricated, one-piece type, square-edge style with expanded flanges.
- c. Weep Screenshot/Track: Prefabricated, one-piece type with perforated face leg extended to form a drip and weep holes in track bottom; designed to drain incidental moisture that gets into wall construction to the exterior.

8. Flashing:

- a. General: Refer to Section 042000 - Unit Masonry, 076200 - Sheet Metal Flashing and Trim; for flashing materials installed by the manufactured masonry installer under this Section.

2.1 MANUFACTURED MASONRY UNIT

A. Manufactured Thin Brick Veneer:

1. Thin Brick shall meet ASTM C1008 Standard Specifications
2. Grade: Exterior
3. Type: TBX – Extruded Brick units.
 - a. Freeze/Thaw: 0.03 percent loss.
 - b. Tensile Strength: 260 psi
 - c. Absorption: 4.41 percent.
 - d. Maximum Saturation Coefficient: 0.81
4. Style and Color: Refer to Section 000200 Material Finish and Color Schedule.

B. Accessories(Trim):

1. Accessory Name: manufacturers standard corner trim units to match specified thin brick units.].

PART 3 –EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer=s instructions prior to commencing work.
2. Surface Preparation:
 - a. Check local building codes for specific water-resistive barrier requirements for exterior applications.
3. Inform Architect of unacceptable conditions immediately upon discovery.
4. Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

A. General:

1. Perform installation of manufactured masonry in accordance with MVMA “Installation Guide for

Adhered Concrete Masonry Veneer", unless more stringent requirements are specified herein.

2. Method: Thick Set installation
3. Comply with masonry manufacturers written data, including product technical bulletins, product catalog installation instructions, and product carton installation instructions.
- B. Flashing: Install related flashing in accordance with manufacturer's instructions to promote proper moisture management and uninterrupted drainage planes.
- C. Casing Beads and Weep Screed/Track:
 1. Casing Bead: Install at perimeter of mortar scratch coat, EXCEPT where weep screed/tracks are specified.
 2. Weep Screed/Track: Install at bottom termination edges of mortar scratch coat, at base of wall, window and door heads, at floor line expansion joints, and elsewhere as shown.
- D. Water-Resistive Barrier:
 1. Install in accordance with barrier manufacturer's instructions in 2 separate layers beginning at the base of the wall over the weep screed/track, shingle style with minimum overlap of 2 inches (50.80 mm) horizontally and minimum sidelap of 6 inches (152.40 mm) vertically, and continue to top of wall. Overlap inside and outside corners minimum 16 inches (406.40 mm) past the corner in both directions.
 - a. Install the first or inner layer in conjunction with flashings to create the drainage plane.
 - b. Install the second or outer layer to prevent the mortar scratch coat from contacting the inner layer.
 2. Coordinate installation of water-resistive barrier with flashing accessories, adjacent barriers if any, doors, windows, and other penetrations, and cladding transitions.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services:
 1. Schedule a site visit by the manufacturer's technical representative prior to acceptance of mock-up. Coordinate site visit with preinstallation conference and review of mock-up.
 2. Schedule additional site visits commensurate with the complexity of the Project.

3.4 ADJUSTING AND CLEANING

- A. Adjusting:
 1. Remove stained and otherwise damaged units and units not matching approved samples.
 2. Masonry units may be repaired if methods and results are approved by Owner and Architect. Use only workers and techniques approved by manufacturer
 3. Replace units which cannot be satisfactorily repaired, in a manner that results in new masonry units matching approved samples, complying with other requirements, and showing no evidence of replacement.
- B. Cleaning:
 1. In-Progress Cleaning: Clean masonry units using fiber brushes and clean water. Do not use acid or commercial cleaners unless specifically approved by the manufacturer. Do not allow cementitious materials to harden on masonry surfaces not intended to receive mortar or grout; clean not later than the end of each day.
 2. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry units as follows:

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- a. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
- C. Perform final cleanup in accordance with manufacturers written instructions.
- D. Upon completion, remove surplus materials, rubbish, tools and equipment.
- E. Divert damaged, unused or leftover masonry units from landfill to recycling facilities.

3.5 PROTECTION

- A. Protect installed masonry in accordance with manufacturer's recommendations.
- B. Protect installed units from mud, dirt, cement, paint, sealant and other materials until completion of Project.
Clean soiled units as specified above.

END OF SECTION 047000

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Wall panels.
 2. Wall panels with engraved graphics and inscriptions.
 3. Trim units.
 4. Decorative elements.
 5. Accessories.

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 fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces. Shop drawings shall bear the seal of the engineer, registered in the State of Michigan, who supervised the design of reinforcement and anchorage for all cast stone units.
- C. Samples:
1. For each color and texture of cast stone required, 4 inches (100 mm) square in size.
 2. For each trim shape required, 4 inches (100 mm) in length.
 3. For colored mortar.
- D. Delegated-Design Submittal: For cast stone masonry and indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, registered in the State of Michigan, responsible for their preparation, design, reinforcement and anchorage for all cast stone units.

1.4 INFORMATIONAL SUBMITTALS

- A. Material test reports. For each mix required to produce cast stone, based on testing according to ASTM C1364, including test for resistance to freezing and thawing.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering cast stone masonry units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and

comprehensive engineering analysis by a qualified professional engineer, including reinforcement, and anchorage.

- B. 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.
 - 1. Manufacturer is a producing member of the Cast Stone Institute.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Retain "Delegated Design" Paragraph below if Contractor is required to assume responsibility for design.

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cast stone masonry units, including reinforcement, and anchorage to substrates

2.2 CAST STONE UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Advanced Cast Stone, Inc.
- 2. American Artstone Co., Inc.
- 3. Architectural Art Stone, Inc.
- 4. Architectural Cast Stone Corp.
- 5. Architectural Cast Stone, Inc.
- 6. Architectural Concrete Company, Inc.
- 7. Architectural Molded Composites, Inc.
- 8. Architectural Ornamental Castings, Inc.
- 9. Architectural Ornaments, Inc.
- 10. Artisan Stone Company, Inc.
- 11. Cast Stone Systems, Inc.
- 12. Classic Cast Stone of Dallas, Inc.
- 13. Continental Cast Stone East; Russell, Inc.
- 14. Continental Cast Stone Manufacturing, Inc.
- 15. Custom Cast Stone, Inc.
- 16. Dura Art Stone.
- 17. DuraStone.
- 18. Pineapple Grove Designs.
- 19. Royal Stone.
- 20. Stone Castle Industries, Inc.
- 21. Techcrete Architectural Precast.

- B. Cast Stone Units: Comply with ASTM C1364.

- 1. Units are manufactured using the manufacturer's selected method.
- 2. Wall Panels: Sizes as indicated on Drawings.
 - a. Engravings: As indicated on Drawings.

3. Trim units including window sills, lintels, surrounds, copings, parapets, and other items as indicated on Drawings.
 4. Decorative elements including medallions and other items as indicated on Drawings.
- C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
1. Provide units that are resistant to freezing and thawing.
 2. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 3. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 4. Provide drips on projecting elements unless otherwise indicated.
- D. Cure Units as Follows:
1. Cure units in enclosed, moist curing room at 95 percent relative humidity and temperature of 100 deg F (38 deg C) for 12 hours or 70 deg F (21 deg C) for 16 hours.
 2. 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 (21 deg C) or above.
 - b. No fewer than seven days at mean daily temperature of 50 deg F (10 deg C) or above.
- E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- F. Colors and Textures: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- B. Dowels: 1/2-inch- (12-mm-) diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- C. Shims: Provide high density (plastic) stone shims between cast stone shapes when stacked vertically to level cast stone pieces and eliminate compression of mortar.
- D. 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.; a Hohmann & Barnard company.
 - b. EaCo Chem, Inc.
 - c. PROSOCO, Inc.
 2. Verify compatibility with adjacent masonry products prior to use.

2.4 MORTAR MIXES

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
- B. Comply with ASTM C270, Proportion Specification.
 - 1. For setting mortar, use Type N.
 - 2. For pointing mortar, use Type N.
- C. Preblended dry mortar mix complying with ASTM C1714/C1714M and capable of producing mortar strength as indicated in ASTM C270.
 - 1. For setting mortar, use Type N.
 - 2. For pointing mortar, use Type N or Type O as appropriate.
- 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.

2.5 SOURCE QUALITY CONTROL

- A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C1364.
 - 1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated in TMS 604.
- B. Install cast stone units to comply with requirements in Section 042000 "Unit Masonry."
- C. 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.
- D. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Fill dowel holes and anchor slots with mortar.
 - 2. Fill collar joints solid as units are set.
 - 3. Build concealed flashing into mortar joints as units are set.
 - 4. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 - 5. 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 (19 mm). 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 (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- G. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
- H. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
 - 1. Rake out joints for pointing with sealant to depths of not less than 3/4 inch (19 mm). Scrub faces of units to remove excess mortar as joints are raked.
 - 2. Keep joints free of mortar and other rigid materials.
 - 3. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated in TMS 604.
- B. 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.
- 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. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 ft. (10 mm in 6 m), 1/4 inch in 20 ft. (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 ft. (10 mm in 6 m), 1/4 inch in 20 ft. (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) 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 (1.5 mm), except where variation is due to warpage of units within tolerances specified.

3.4 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 methods described in Cast Stone Institute Technical Bulletin #39.
 - 6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 047200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes structural steel.

1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using AISC 360.
 - 2. Use ASD; data are given at service-load level.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
- C. Qualification Data: For qualified Installer, fabricator, testing agency.
- D. Welding certificates.
- E. Mill test reports for structural steel, including chemical and physical properties.
- F. Source quality-control reports.

1.5 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 A325 or A490 Bolts."

C. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry or rusty before use.

3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
 - C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating, baked epoxy-coated finish.
 - D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Mechanically deposited zinc coating.
 - E. Unheaded Anchor Rods: ASTM F 1554, Grade 36, ASTM F 1554, Grade 55, weldable.
 - 1. Configuration: Straight.
 - 2. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
 - F. Headed Anchor Rods: ASTM F 1554, Grade 36, ASTM F 1554, Grade 55, weldable, straight.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
 - G. Threaded Rods: ASTM A 36/A 36M, ASTM A 193/A 193M, Grade B7.
 - 1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
 - H. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- 2.3 PRIMER
- A. Primer: Comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."
 - B. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.
 - C. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, Pretensioned, Slip critical as required.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.

3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- 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.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.

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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Splice members only where indicated.
- E. Do not use thermal cutting during erection.
- F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, Pretensioned, Slip critical as required.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.

1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.

- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.5 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. K-series steel joists.
 - 2. KCS-type K-series steel joists.
 - 3. LH-series long-span steel joists.
 - 4. Joist accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
- C. Welding certificates.
- D. Manufacturer certificates.
- E. Mill Certificates: For bolts.
- F. Field quality-control test and inspection reports.
- G. Research/Evaluation reports.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by the Steel Joist Institute (SJI) to manufacture joists complying with SJI standard specifications and load tables.
- B. SJI Specifications: Comply with SJI's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, SJI's "Specifications") that are applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
- D. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.2 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists per construction drawings.
- B. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- C. Do not camber joists.

2.3 LH-SERIES STEEL JOISTS

- A. Long-Span Steel Joist: Manufactured steel joists in accordance with "Standard Specification for Longspan Steel Joists, LH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated on Drawings.
 - 1. Joist Type: LH-series steel joists per construction drawings.
- B. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- C. Do not camber joists.

2.4 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.5 JOIST ACCESSORIES

- A. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- B. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.
- C. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- D. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.6 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories. Apply 1 coat of shop primer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
- C. Field weld joists to supporting steel, bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connections' "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

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STEEL JOIST FRAMING
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3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.

1.2 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product certificates.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Research/Evaluation Reports: For steel deck.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- C. 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."

1.4 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. ASC Profiles, Inc.
 2. Canam Steel Corp.;The Canam Manac Group.
 3. Consolidated Systems, Inc.
 4. DACS, Inc.
 5. D-Mac Industries Inc.
 6. Epic Metals Corporation.
 7. Marlyn Steel Decks, Inc.
 8. New Millennium Building Systems, LLC.
 9. Nucor Corp.; Vulcraft Division.
 10. Roof Deck, Inc.
 11. United Steel Deck, Inc.
 12. Valley Joist; Division of EBSCO Industries, Inc.
 13. Verco Manufacturing Co.
 14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z275) zinc coating.
 2. Deck Profile: As indicated.
 3. Profile Depth: As indicated.
 4. Design Uncoated-Steel Thickness: As indicated.

2.3 ACCESSORIES

- A. General: 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, No. 10 (4.8-mm) minimum diameter.
- 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. Galvanizing Repair Paint: ASTM A 780.
- G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. 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.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).

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STEEL DECKING
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- I. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches (305 mm) apart with at least one weld or fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- J. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.4 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Manufactured metal ladders and ship ladders
3. Metal Bollards and protection sleeves.
4. Fire Hose drying brackets.
5. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufactured metal ladders and ships ladders

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.

1.3 WARRANTY.

- A. Limited Warranty Manufactured Metal Ladders: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

- B. Structural Performance of Ladders: Metal ladders withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
 5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch (6.4 mm), whichever is less.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting".
1. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 2. Zinc-Rich Primer: Comply with SSPC-Paint 20 and compatible with topcoat.

3. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. 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 (20 MPa).

2.5 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 (1 mm) 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.
- 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. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.6 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.

2.7 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 (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) 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 (50 mm) 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.

2.8 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3.
- B. Steel Ships Ladders and Components: Stair, platform, mounting brackets and handrails on both sides :
 - 1. Capacity: Unit shall support a 1,000 lb. (454 kg) total load without failure.
 - 2. Degree of Incline: 60 to 70 degrees, or as indicated on drawings.
 - 3. Performance Standard: Units designed and manufactured to meet or exceed OSHA 1910.25.
 - 4. Components: Manufacturer's standard components for:
 - a. Stair Stringer: steel channels.
 - b. Stair Treads and Platforms: diamond plate steel, welded and bolted to stringer
 - c. Fasteners: All mounting hardware shall be Type 316 stainless steel.
 - d. Stair Mounting Brackets:
 - 1) Floor Brackets
 - 2) Top Bracket
 - 5. Handrails: 1-1/4 inches (32 mm) steel pipe provided with internal fittings.
 - 6. Finishes:
 - 1) Standard: Prime painted
 - 7. Form treads with integral nosing and back edge stiffener and with open risers.
 - 8. Weld steel supporting brackets to stringers and weld treads to brackets.
 - 9. Fabricate platforms with integral nosings matching treads and weld to platform framing.

2.9 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
 - 1. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve.
 - 2. Galvanize Metal Bollards.

2.10 FIRE HOSE DRYING BRACKETS

- A. Fabricate fire hose drying brackets from steel angles and shapes of size and at locations indicated. Weld adjoining members together to form a single unit.
 - 1. Galvanize and prime fire hose drying brackets.
 - a. Prime with zinc-rich primer

2.11 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.
 - 1. Galvanize bearing and leveling plates.
 - 2. Prime plates with zinc-rich primer.

2.12 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.
 - 1. Galvanize and prime loose steel lintels located in exterior walls.
 - 2. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.13 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 BOLLARD COVERS

- A. Provide HDPE (high density polyethylene) domed top, bollard covers, with ultraviolet and anti-static additives, and two reflective tape bands.

- B. Basis of Design: "Post Guard", as manufactured by Encore Commercial Products, Farmington Hills, MI., (866) 737-8900; www.postguard.com.
 - 1. Height: as indicated on drawings or as required to completely cover bollard.
 - 2. Size: as indicated on drawings for each bollard.
 - 3. Color: As selected by Architect from manufacturer's complete color chart.
 - 4. Warranty: 5 years.

2.15 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.16 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. 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 primers specified in Section 099123 "Interior Painting" unless otherwise indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Items Indicated to:
 - a. Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. 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.

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.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS
- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
 - B. Anchor shelf angles securely to existing construction with anchor bolts.
- 3.3 INSTALLATION OF 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.
- 3.4 INSTALLATION OF METAL LADDERS
- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
 - B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.
- 3.5 INSTALLATION OF SHELF ANGLES
- A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.
- 3.6 INSTALLATION OF METAL BOLLARDS
- A. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches (1050 mm) deep and 3/4 inch (19 mm) larger than OD of bollard]. 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 (3 mm) toward bollard.

- B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.
- D. Install HDPE bollard cover with installation foam tape to secure in-place.

3.7 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Preassembled steel stairs with concrete-filled treads.
 - 2. Steel railings and guards attached to metal stairs.
 - 3. Steel handrails attached to walls adjacent to metal stairs.

1.2 COORDINATION

1.3 COORDINATION

- A. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

1.4 SUBMITTALS

- A. Product Data: For metal stairs and the following.
 - 1. Woven-wire mesh.
 - 2. Gratings.
 - 3. Shop primer products.
 - 4. Nonslip-aggregate concrete finish.
 - 5. Handrail wall brackets.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
 - 3. Include plan at each level.
 - 4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
- C. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which the Project is located.
- B. Welding Certificates

1.6 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch (6.4 mm), whichever is less.
- B. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

- a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Seismic Performance: Provide metal stairs capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed).
- D. 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.
- E. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.
- F. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.
- G. Iron Castings: Either gray iron, ASTM A 48/A 48M, Class 30, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- H. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30 (Grade 205).
- I. Woven-Wire Mesh: Intermediate-crimp, 2-inch (50-mm) woven-wire mesh, made from 0.135-inch (3.5-mm) nominal diameter wire complying with ASTM A 510 (ASTM A 510M).

2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
- B. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.
- C. Welded Wire Fabric: ASTM A 185, 6 by 6 inches (152 by 152 mm)--W1.4 by W1.4, unless otherwise indicated.

2.4 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
- C. Manufacturers / Fabricators:
 - 1. Alfab, Inc.
 - 2. American Stair, Inc.
 - 3. Sharon Companies Ltd. (The).
 - 4. Or approved equal.
- D. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 - 1. Provide galvanized finish for installations in Apparatus Room, Hose Tower and where indicated.
- E. Steel Tubing for Railings and Guards: ASTM A500/A500M (cold formed) or ASTM A513/A513M.
 - 1. Provide galvanized finish for installations in Apparatus Room, Hose Tower and where indicated.
- G. Steel Pipe for Railings and Guards: ASTM A53/A53M, 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 installations in Apparatus Room, Hose Tower and where indicated.
- H. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, unless another grade is required by design loads; exposed.
- I. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, unless another grade is required by design loads.
- J. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- K. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- L. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
- M. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.5 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.
 - 1. Select fasteners for type, grade, and class required.

- B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 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, Hose Tower and Apparatus Room stairs: Alloy Group 1 (A1) stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.6 MISCELLANEOUS MATERIALS

- A. Handrail Wall Brackets: Cast iron, center of rail 2-1/2 inches (63.5 mm) from face of wall.
- B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Zinc-Rich Primer: Comply with SSPC-Paint 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] [ASTM A780/A780M] and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.
- I. Concrete Filled Treads:
 - 1. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi (20 MPa) and maximum aggregate size of 1/2 inch (13 mm) unless otherwise indicated.
 - 2. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.

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3. Plain Steel Welded-Wire Reinforcement: ASTM A1064/A10645M, galvanized steel, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated on Drawings.
4. Reinforcement Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening welded-wire reinforcement in place.
 - a. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.
5. For galvanized reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.7 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. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Use connections that maintain structural value of joined pieces.
 3. Provide galvanized finish for installations in Apparatus Room, Hose Tower and where indicated.
 4. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
- B. Assemble stairs, railings, and guards in shop to greatest extent possible.
 1. Disassemble units only as necessary for shipping and handling limitations.
 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
 1. Remove burrs and ease edges, unless otherwise indicated.
 2. 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.
 1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- E. Weld connections to comply with following:
 1. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed connections, finish exposed welds smooth and blended.

2.8 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
1. Stringers: Fabricate stringers of steel plates, steel channels, or steel rectangular tubes as indicated on Drawings.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel and rectangular tube stringers.
 - c. Finish: Shop primed and field painted.
 2. Platforms: Construct of steel plates, steel channels, or steel rectangular tubes headers and miscellaneous framing members as indicated on Drawings and as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel and rectangular tube framing.
 - b. Finish: Shop primed and field painted.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.
 4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch (1.7 mm).
1. Steel Sheet: Uncoated, cold-rolled steel sheet unless otherwise indicated.
 2. Directly weld metal pans to stringers; locate welds on top of sub-treads where they will be concealed by concrete fill. Do not weld risers to stringers.
 3. Attach risers and sub-treads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 4. Shape metal pans to include nosing integral with riser.
 5. At Contractor's option, provide stair assemblies with metal pan sub-treads filled with reinforced concrete during fabrication.
 6. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platform framing.
 - a. Smooth Soffit Construction: Construct sub-platforms with flat metal under surfaces to produce smooth soffits.
 7. Fabricate treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections.
 - a. Secure treads to stringers with bolts.
 - b. Secure grating to platform framing by welding.

- D. Risers: Solid steel plate, shop prime and field painted.

2.9 FABRICATION OF STAIR RAILINGS AND GUARDS

- A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
- B. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 1-5/8-inch- (41-mm-) diameter top and bottom rails, and posts.
 - 2. Picket Infill: 3/4-inch- (19-mm-) round pickets spaced to prohibit the passage of a 4-inch (100-mm) diameter sphere.
 - 3. Intermediate Rails Infill: 1-1/2-inch- (38-mm-) diameter intermediate rails spaced less than 4 inches (100 mm) clear.
- C. Welded Connections: Fabricate railings and guards with welded connections.
 - 1. Fabricate connections that are exposed to weather in a manner that excludes water.
 - a. Provide weep holes where water may accumulate internally.
 - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 - 3. Weld all around at connections, including at fittings.
 - 4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 5. Obtain fusion without undercut or overlap.
 - 6. Remove flux immediately.
 - 7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards Finish #3 - Partially dressed weld with spatter removed as shown in NAAMM AMP 521.
- D. Form changes in direction of railings and guards as follows:
 - 1. By flush bends or by inserting prefabricated flush-elbow fittings.
- E. 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.
- F. Close exposed ends of railing and guard members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 - 1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- H. Connect posts to stair framing by direct welding unless otherwise indicated.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 2. Provide ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
 3. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.
- J. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.10 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items 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.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed products:
1. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- D. 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.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- 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.

PARTNERS 21-146A/B
METAL STAIRS AND RAILINGS
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1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.
 - a. Clean bottom surface of baseplates.
 - b. Set steel-stair baseplates on wedges, shims, or leveling nuts.
 - c. After stairs have been positioned and aligned, tighten anchor bolts.
 - d. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Place and finish concrete fill for treads and platforms to comply with Division 3 Section "Cast-in-Place Concrete."
- G. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 1. Anchor posts to steel by welding or bolting to steel supporting members.
 2. Anchor handrail and guard ends to concrete and masonry with steel round flanges welded to rail and guard ends and anchored with post-installed anchors and bolts.
- H. Attach handrails to wall with wall brackets.
 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 2. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
- I. Adjusting and Cleaning:
 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.
 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055100

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Wood blocking, cants, and nailers.
 2. Wood furring.
 3. Plywood backing panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 2. At Exterior conditions, Provide "Exterior Fire-X", pressure – impregnated fire-retardant lumber and plywood as manufactured by Hoover Treated Wood Products, or equal.

- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants.
 - 4. Furring.
 - 5. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
 - 2. Eastern softwoods; No. 2 Common grade; NeLMA.
 - 3. Northern species; No. 2 Common grade; NLGA.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.6 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.7 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
- C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWPAs M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).

3.2 PROTECTION

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

END OF SECTION 061000

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Interior wood paneling.
3. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
4. Shop priming of interior architectural woodwork.
5. Shop finishing of interior architectural woodwork.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.
4. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. 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.

- ##### C. Samples: For each exposed product and for each shop-applied color and finish specified.

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. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Fabricator and installer shall be a 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. Build mockups of typical interior architectural woodwork as shown on Drawings
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.6 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.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL 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 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Hardwood Lumber:
1. Wood Species: Hard Maple.
 2. Cut: Quarter sawn.
 3. Wood Moisture Content: 5 to 10 percent.
 4. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
 5. For trim items wider than available lumber, use veneered construction. Do not glue for width.
 6. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

2.3 INTERIOR PANELING FOR TRANSPARENT FINISH

- A. Lumber: Premium Solid Hardwood Beadboard Paneling

1. Manufacturer: Baird Brothers Sawmill,
 - a. 7060 Croy Rd. Canfield, OH 44406
 - b. Ph: 330.533.3122
2. Style: B606-MAP-144-B
3. Wood Species: Hard Maple.
4. Wood Moisture Content: Kiln-dried to 5 to 10 percent.
5. Size: Nominal 5/8 inch x 5 inch wide, tongue & groove.
6. Length: Lengths as long as possible to avoid end joints.
7. Finish: Unfinished, for field staining and finishing.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: CustomWood Species: Any closed-grain hardwood.
 1. Wood Moisture Content: 5 to 10 percent.

2.5 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. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.6 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant-Treated Wood Materials: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products in accordance with test method indicated by a qualified testing agency.
 1. Use treated materials that comply with requirements of the Architectural Woodwork Standards. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
 2. For items indicated to receive a stained, transparent, or natural finish, use organic resin chemical formulation.

3. Mill lumber before treatment, and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
- C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less in accordance with ASTM E84.
1. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2, except for the following minimum properties: modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2070 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 and 225 lbf (1100 and 1000 N), respectively.
 2. For panels 13/16 to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1, except for the following minimum properties: modulus of rupture, 1300 psi (9 MPa); modulus of elasticity, 250,000 psi (1720 MPa); linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf (1100 and 780 N), respectively.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard (MDF) panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less in accordance with ASTM E84.

2.7 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: see Section 061000 – Rough Carpentry
- 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.

2.8 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 (1.5 mm) unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
- 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. 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.

2.9 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 099123 "Interior Painting."
 1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing."
 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.10 SHOP FINISHING

- A. Finish interior architectural woodwork with transparent finish and / or opaque finish as indicated on Drawings at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.
- C. Transparent Finish:
 1. Architectural Woodwork Standards Grade: Same as item to be finished.
 2. Finish System – AWI-12: Polyurethane, Water Based.
 3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 4. Staining: Match Architect's Sample – Refer To 000200 - Color and Materials Finish Schedule.
 6. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 7. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood
 8. Gloss and Sheen Level: MPI Gloss Level-4, Satin
 - a. Gloss of 20 to 35. units measured on 60-degree gloss meter in accordance with ASTM D523.

D. Opaque Finish:

1. Architectural Woodworking Standards Grade: Same as item to be finished.
2. Finish System – TR-: Polyurethane, Water Based.
3. Color: Match Architect's Sample – Refer To 000200 - Color and Materials Finish Schedule.
4. Sheen: Satin, 31-45. Gloss units measured on 60-degree gloss meter in accordance with ASTM D523.

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 (3 mm in 2400 mm).
- 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.
 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

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 1. Inspection entity is to prepare and submit report of inspection.

END OF SECTION 064023

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Cold-applied, emulsified-asphalt dampproofing.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 PROJECT CONDITIONS

- A. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. APOC, Inc.; a division of Gardner Industries.
 - 2. BASF Corporation.
 - 3. The Brewer Company.
 - 4. Euclid Chemical Company.
 - 5. Henry Company.
 - 6. Karnak Corporation.
 - 7. Mar-flew Waterproofing and Building Products.
 - 8. W.R. Meadows, Inc.
 - 9. or approved equal.
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- E. VOC Content: 0.25 lb/gal. (30 g/L) or less.

2.2 MISCELLANEOUS MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.2 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
- B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior.
 - 1. Apply from finished-grade line to top of footing, extend over the entire top of footing.
- C. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls up to the underside of the thru wall flashing.

3.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. On Concrete Foundations: Apply 2 brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m), or 1 trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
- B. Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat.
- C. On Exterior Face of Inner Wythe of Cavity Walls: Apply primer and 1 brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m). Apply up the wall a minimum of 3 courses, refer to drawings.

3.4 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course.
 - 1. Install protection course on same day of installation of dampproofing to ensure adhesion.

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Extruded polystyrene foam-plastic board.
 - 2. Glass-Fiber Blanket Insulation
 - 3. Mineral-wool blanket (Sound attenuation insulation).
 - 4. Fire Safing insulation.

1.2 RELATED SECTIONS

- A. Division 7: Nail-base Insulation Panels, section 072210.
- B. Division 7: Polyvinyl-Chloride (PVC) Roofing, section 075419.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes shall less than indicated for each product when tested in accordance with ASTM E84.
- B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- D. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches (305 mm) and wider in width.
- E. Thermal-Resistance Value (R-Value): R-value as indicated below in accordance with ASTM C518.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards."
- B. Extruded Polystyrene Board, Type IV (for use in exterior walls): ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; Class A, maximum flame-spread and smoke-developed indexes of 0 and 155, respectively, per ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Chemical Company (The); "STYROFOAM Brand CAVITYMATE Ultra" Insulation or a comparable product by one of the following:
 - a. DiversiFoam Products.
 - b. Owens Corning.
 - 2. Thickness: 2.18 inches in cavity walls
 - a. Minimum R Value: 12.0
 - 3. Square edge.
 - 4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly
- C. Extruded Polystyrene Board, Type VI (use underslab and interior footing perimeter, except at Apparatus Bay): ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Chemical Company (The) ; STYROFOAM Brand HIGHLOAD 40 Insulation. or a comparable product by one of the following:
 - a. DiversiFoam Products.
 - b. Kingspan Insulation.
 - c. Owens Corning.
 - d. Soprema, Inc.
 - 2. Thickness: 2 inches
 - a. Minimum R Value: 5.0 per inch.
- D. Extruded Polystyrene Board, Type V (use underslab and interior footing perimeter at Apparatus Bay): ASTM C 578, Type V, 100-psi (276-kPa) minimum compressive strength; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Chemical Company (The) ; STYROFOAM Brand HIGHLOAD 100 Insulation. or a comparable product by one of the following:
 - a. DiversiFoam Products.
 - b. Kingspan Insulation.
 - c. Owens Corning.
 - d. Soprema, Inc.
 - 2. Thickness: 2, 3, and 4 inches as indicated on drawings
 - 3. Minimum R Value: 5.0 per inch.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Subject to compliance with requirements, provide products by Owens Corning Pink NextGen Fiberglas Insulation, or a comparable product by one of the following:
 - 1.
 - 2. Johns Manville,
 - 3. Guardian,
 - 4. Knauf
- B. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I, Class A; passing ASTM E136 for combustion characteristics.
 - a. Thickness: as indicated on drawings
 - b. R-Value: As indicated on drawings
 - c. Noncombustible per ASTM E 136.
 - d. Flame spread less than 25, smoke developed index less than 50 per ASTM E84.

2.4 MINERAL-WOOL BLANKETS (Sound-Attenuation Batt Insulation)

- A. Mineral-Wool Blanket, Unfaced: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Thermafiber, Inc.; an Owens Corning company; FS-15 or a comparable product by one of the following:
 - a. Industrial Insulation Group, LLC (IIG-LLC).
 - b. Roxul Inc.
 - 2. Minimum 3" thick.

2.5 FIRE SAFING MINERAL WOOL INSULATION

- A. Mineral Wool Fire Safing Insulation: ASTM C612, Type IA, IB, II, III, IVA, Class 1, 6.0 pcf density, unfaced; maximum flame-spread and smoke-developed indexes of 0 and 0, respectively, per ASTM E 84.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Owens Corning "Thermafiber", fire safing mineral wool insulation, or a comparable product by one of the following:
 - a. Johns-Manville.

2.6 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

- C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
- D. ***Eave Ventilation Troughs: Preformed, rigid plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.***
 - 1. ***Basis of Design: Provide Owens-Corning "Raft-R-Mate" extruded polystyrene foam attic rafter vent.***
 - a. ***Air Channel Depth: 1.5 inches.***
 - b. ***Net Free-Area: 22.3 sq. in.***
 - c. ***Size: to fit 16" or 24" rafter or truss spacing as indicated on drawings.***
 - d. ***Length: 48 inches.***

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.
- E. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- F. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where indicated as well as where an exterior wall or roof area is void of any insulative material. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls.

3.3 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. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
 1. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. ***Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.***
 5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
- C. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 072100

SECTION 072210 - NAILBASE INSULATION PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes vented composite nailbase insulation panel system.

1.2 RELATED SECTIONS

- A. Section 053100 - Metal Deck.
- B. Section 061000 – Rough Carpentry.
- C. Section 072713 – Modified Bituminous Sheet Air and Vapor Barriers
- D. Section 074113.16 – Standing Seam Metal Roof Panels.

1.3 REFERENCES

- A. ASTM C 209 – Methods of Testing Insulating Board, Structural and Decorative.
- B. ASTM C 1289 – Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.
- C. ASTM D 1621 – Test Methods for Compressive Properties of Rigid Cellular Plastics.
- D. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- E. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.
- F. CAN/ULC S770 - Standard Test Method for Determination of Long Term Thermal Resistance of Closed Cell Plastic Thermal Insulating.
- G. UL 1256 - Fire Test of Roof Deck Constructions.
- H. PS2-92 - Performance Standard for Wood-based Structural-use Panels.
- I. FM 4450 - Class I Insulated Steel Deck Roofs.
- J. FM 4470 - Class I Roof Covers (Foam Core Only).
- K. FM Class 1 approval for steel roof deck constructions, Class 1 Fire and I-60 and I-90 wind storm classifications

1.4 SYSTEM DESCRIPTION

- A. Physical properties (Foam Core):
 - 1. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type V, 20 psi (138 kPa)

1. minimum for Grade 2 or 25 psi (172 kPa) minimum for Grade 3.
 2. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
 3. Moisture Vapor Transmission: ASTM E 96, < 1 perm ((57.5ng/(Pasm²)).
 4. Water Absorption: ASTM C 209, < 1 percent by volume.
 5. Service Temperature: Minus 100 degrees to 250 degrees F (Minus 73 degrees C to 122 degrees C).
 6. Flame Spread: 75 or less when tested in accordance with ASTM E 84
 7. Smoke Developed: 450 or less when tested in accordance with ASTM E 84.
- B. Foam Core R Values: Based on LTTR (Long Term Thermal Resistance) in accordance with ASTM C 1289.
- C. UL Assemblies: Insulated metal deck assemblies - UL 1256 (nos. 120, 123).
- D. UL Assemblies: Insulated metal deck assemblies - TGDY. R20624 shingle deck accessory; nail base roof insulation classified for use with any Class A, B, or C asphalt glass mat or asphalt organic shingles, metal or tile roof coverings.
- E. FM Class 1 (Low Slope) approval for steel roof deck constructions, Class 1 Fire and I-60 and I-90 wind storm classifications.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on nailbase insulation panels and fasteners to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- D. Verification Samples: For each finish product specified, two samples, representing actual product.
1. Submit minimum 6 by 6 inch (152 mm by 152 mm) samples of each board type required.
 2. Submit samples of each fastener type required.
- E. Manufacturer's Certificate: Certify nailbase insulation panels will conform to specified performance requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures polyisocyanurate and fully assembled nailbase insulation panels.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with the manufacturer recommendations.

- B. Store product on a solid flat foundation and elevate a minimum of 4 inches above the finished surface.
- C. For on-site storage longer than two weeks, slit packaging on 4 sides to allow the product to breathe, and then completely covered with a breathable tarpaulin.
- D. Protect insulation from open flame and keep dry at all times.

1.8 PROJECT CONDITIONS

- A. Install only as much insulation as can be covered the same day by a completed roof covering material.

PART 2 PRODUCTS

2.1 DESCRIPTION

- A. Provide vented composite nailbase insulation panel system consisting of polyisocyanurate foam insulation with middle layer of wood spacers and a top layer of oriented strand board (OSB) or CDX plywood.

2.2 MANUFACTURERS

- A. Basis of Design: Hunter "Cool-Vent" panels as manufactured by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. (888) 746-1114. info@hpanels.com.
- B. Subject to compliance with requirements, the following manufacturers are acceptable:
 - 1. Atlas Roofing Corporation,
2000 Riveredge Parkway, Atlanta GA
770.952.1442
<https://roof.atlasrwi.com/>
 - 2. GAF Roofing Corporation,
1 Campus Drive, Parsippany, NJ 07054
800.766.3411 or 800.522.9224
www.gaf.com

2.3 PANEL CONSTRUCTION

- A. ***Panels shall consist of a top layer of APA/TECO rated oriented strand board (OSB) core or CDX plywood laminated, a middle layer of solid wood blocking spacers creating a 1-1/2 inch air space, and a bottom layer of fiber reinforced faced closed cell polyisocyanurate rigid foam insulation.***
 - 1. Polyisocyanurate foam insulation shall conform to ASTM C 1289, Type V.
 - a. Compressive Strength: 20 pounds per square inch (138 kPa) Grade 2.
 - 2. OSB and plywood top layer substrate shall conform to PS2 and shall be as follows:
 - a. OSB or plywood:
 - 1) Type:
 - (a) Standard sheathing grade.

- 2) Thickness:
 - (b) 5/8 inch (15.9 mm).
- b. Edge detail:
 - 1) Rabbeted or T & G

2.4 PANEL TYPES

A. *Hunter "Cool Vent" nailbase Insulation Panels consisting of:*

1. *5/8 inch (16 mm) OSB or plywood,*
2. *1.5" wood blocking spacers, creating 1.5 inches vented air space,*
3. *Insulation Thickness: 2.66 inches (79 mm), R Value 15.0 minimum,*
4. *Overall panel size: 47-1/2 inches by 95-1/2 inches (1207 mm by 2426 mm)*
5. *Overall panel thickness: 4.78 inches*

2.5 PANEL FASTENERS

A. Fasteners shall be FM Approved manufacturer's panel fasteners for steel deck application.

B. Fasteners shall be corrosion resistant with oversized heads. Type and length of fasteners shall be as recommended by manufacturer.

1. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.
2. See the panel manufacturer application guide for instructions.
 - a). Fasteners shall penetrate the top flute of steel deck a minimum of 1 inch (25 mm).
 - b). Penetration of fastener into bottom flute is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify deck, adjacent materials, and structural backing is dry and ready to receive insulation.

C. Verify deck surface is flat, free of fins, protrusions and irregularities.

D. If deck 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. *Air and Vapor Barrier*

1. Refer to Section 072713 Modified Bituminous Sheet Air and Vapor Barriers.

- a. Apply air and vapor barrier as specified to decking prior to the panel installation.**

3.3 INSTALLATION

- A. Install in accordance with manufacturer's current printed instructions.
- B. Only install enough panels per day that can be covered the same day by a completed roof covering material.
- C. Use only UL or FM approved synthetic underlayment over nailbase insulation panels.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

END OF SECTION 072210

SECTION 072713 - MODIFIED BITUMINOUS SHEET AIR AND VAPOR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes self-adhering, cold applied, modified bituminous sheet air and vapor 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. Shop Drawings: For air and vapor barrier assemblies.
 - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of modified bituminous sheet air barrier.
- B. Product test reports.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 SELF-ADHERING SHEET AIR BARRIER

- A. Aluminum-Faced Modified Bituminous Sheet: 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 36 mils (0.9 mm) of rubberized asphalt laminated to a 4-mil- (0.1-mm-) thick, cross-laminated polyethylene film faced with aluminum foil, with release liner on adhesive side.
1. Basis of Design: Provide VapAir Seal MD air and vapor barrier as manufactured by Carlisle, P.O. Box 7000, Carlisle, PA 17013; ph: 800-479-6832.
 2. Physical and Performance Properties:

a.	Overall Thickness:	ASTM D5147:	0.015 inches.
b.	Weight:	EN1849-2:	0.06 lb./sf.
c.	Tensile Strength:	ASTMD412	250 psi.
d.	Elongation:	ASTM D1970	330%
e.	Low Temperature Flexibility:	ASTM D1970	20 Deg.
f.	Air Permeance:	ASTM E2178:	0.02 L/s x sq. m @ 75-Pa.
g.	Hydrostatic Pressure	AATCC 127	Pass
h.	Peel Adhesion:	ASTM D903	14 lb.
i.	Vapor Permeance:	ASTM E96/D1970	0.31 perms
j.	Puncture Resistance:	ASTM D5602	54.6 lb.
k.	Water Vapor Resistance:	BSENISO 12572	4,310 MNs/g.
l.	Calorific Value:	DIN 51900-1	< 10,500 kJ/m ²
 3. Fire Classification: FM Standard Class No.4470 Class 1

2.3 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge isolation joints, expansion joints and discontinuous deck to wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

3.2 INSTALLATION GENERAL

- A. Install materials in accordance with air-and vapor barrier manufacturer's written instructions and details and in accordance with recommendations in ASTM D6135 to form a seal with adjacent construction and ensure continuity of air and water barrier.
- A. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous air-barrier sheet produced for low-temperature application. Do not install low-temperature sheet if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- B. Surface shall be dry and clean from debris.
- C. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 1. Confirm in writing that primer is not required on metal substrates.
- D. INSTALLATION
 - 1. Roll barrier sheet out flat, without creases. Align and set into position.
 - 2. Accurately align sheets and set into position. Maintain uniform 2-inch- (51-mm-) minimum lap widths and end laps.
 - 3. Apply and firmly adhere air/vapor barrier sheets over area to receive air/vapor barrier. Remove the release film. Press the sheet down uniformly using, for example, a wide broom. All laps must be rolled down using a hand roller.
 - 4. On profiled decking, end laps in the air/vapor barrier sheet should be laid over with an additional strip of air/vapor barrier sheet or flat metal plate, approximately 6" wide, for support.
 - 5. Overlap and seal seams, and stagger end laps to ensure airtight installation
 - 6. Any large gaps at angle change must be filled in with insulation to support membrane.
 - 7. Install air/vapor-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air/vapor barrier.
 - 8. Connect and seal air/vapor-barrier sheet continuously to exterior wall membrane air barrier, and other construction used in roof openings, using accessory materials.
- E. Repair punctures, voids, and deficient lapped seams in air/vapor barrier. Slit and flatten fishmouths and blisters. Patch with air/vapor-barrier sheet extending 6 inches (150 mm) beyond repaired areas in all directions.
- F. Do not cover air barrier until it has been tested and inspected by testing agency.

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- G. Correct deficiencies in or remove air/vapor barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: As determined by testing agency from among the following tests:
 - 1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, chamber pressurization or depressurization with smoke tracers, or ASTM E1186, chamber depressurization using detection liquids.
 - 3. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with ASTM E783 or ASTM E2357.
 - 4. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.
- C. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- D. Repair damage to air/vapor barriers caused by testing; follow manufacturer's written instructions.
- E. Prepare test and inspection reports.

3.4 CLEANING AND PROTECTION

- A. Protect air/vapor-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

END OF SECTION 072713

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vapor-retarding, fluid-applied air barriers.

1.2 RELATED SECTIONS

- A. DIVISION 04 – Masonry Section 042000 – Unit Masonry

1.3 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air/vapor barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Air Barrier Manufacturer's guide specification
 - 2. Air Barrier Manufacturer's technical data sheets
- B. Certificates:
 - 1. Product certification that the assembly components are supplied and warranted by single source Air Barrier Manufacturer
- C. Shop Drawings: For Manufacturer's air-barrier assemblies.
 - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
- D. Product certificates.

- E. Qualification data.
- F. Product test reports.
- G. Sample warranty as specified.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. Obtain air barrier, flashings, sealants and primers from a single air barrier manufacturer regularly engaged in the manufacturing and supply of the specified products.
 - 2. Verify product compliance with federal, state, and local regulations.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Mockups:
 - 1. Where directed by architect, construct mock-ups to verify selections made under submittals and to set quality standards for materials and execution in accordance with Section 14339.
 - 2. Before beginning installation of air barrier, build mockups of exterior wall assemblies and incorporate air barrier membrane.
 - 3. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
- D. Preinstallation Conference: Conduct preinstallation conference at Project Site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery of Materials:
 - 1. Deliver materials to the jobsite in undamaged and clearly marked containers and/or wrapping indicating the name of the Air Barrier Manufacturer and product.
- B. Storage of Materials:
 - 1. Store materials as recommended by the Air Barrier Manufacturer and conform to applicable safety regulatory agencies. Refer to all applicable data including, but not limited to, Safety Data Sheets, Product Data sheets, product labels, and specific instructions for personal protection.
 - 2. Keep solvents away from open flame or excessive heat.
 - 3. Store rolled materials on end.
- C. Handling:
 - 1. Product requirements may vary. Refer to product specific Safety Data Sheet.

1.7 SITE CONDITIONS

A. Environmental Requirements:

1. Do not perform Work during rain.
2. Do not perform Work on frost covered or wet substrates.
3. Product requirements may vary. Refer to product specific Technical Data Sheet.

B. Protection:

1. It is the responsibility of the installing Subcontractor to protect all surfaces not included in scope of Work from damage.
2. Protect top and backside of substrate walls against bulk water during and after application of air barrier.

C. Complete preparation Work prior to installing the air barrier assembly.

1.8 WARRANTY

- A. Provide manufacturer's standard 10-year material warranty.

PART 2 - PRODUCTS

2.1 HIGH-BUILD AIR BARRIERS, VAPOR RETARDING

- A. High-Build, Vapor-Retarding Air Barrier: synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 47 mils or thicker over smooth, void-free substrates.

1. Synthetic Polymer Type:

- a. Basis-of-Design Product: Subject to compliance with requirements, provide Henry Company; Air-Bloc 16MR Fluid Applied Air and Vapor Barrier or a comparable product by one of the following:

- 1) Carlisle Coatings & Waterproofing Inc.
- 2) Grace Construction Products; W.R. Grace & Co. -- Conn.
- 3) Rubber Polymer Corporation, Inc.
- 4) W. R. Meadows, Inc.

2. Physical and Performance Properties:

- a. Single-component, water-based, water-resistive air barrier designed to provide a vapor impermeable air and water barrier when applied on above-grade wall assemblies, having the following typical properties

- 1) Color: Gray
- 2) Minimum Application Temperature: +20 °F (-6 °C)
- 3) Service Temperature: -40 °F to +180 °F (-40 °C to +82 °C)
- 4) Air Permeance:
 - a) Material (ASTM E2178): 0.0013 L/s.m.2

- b) Air Leakage – Assembly (ASTM E2357): Pass
- 5) Water vapor permeance:
 - a) 0.03 perms to ASTM E96, Method A.
- 6) Elongation (ASTM D412): 270%
- 7) Water Absorption (ASTM D570): 4.6%
- 8) Tensile Strength (ASTM D412): 100 psi
- 9) Nail Sealability (AAMA 711/ASTM D1970 modified): Pass
- 10) Wet Film Thickness minimum:
 - a) Smooth Surfaces (Exterior Gypsum Board, Formed Concrete, etc.): 60 mils.
 - b) Rough Surfaces (Masonry, etc.): 90 mils.
- 11) Elongation: 270% to ASTM D 412.
- 12) Surface Burning Characteristics (ASTM E84):
 - a) Flame Spread Index: 20, Class A
 - b) Smoke developed: 85, Class A
- 13) NFPA 285 Compliant.

B. ACCESSORY MATERIALS

1. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

2.2 ACCESSORY MATERIALS

- A. General: Accessory 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. Self-Adhered transition membrane shall be an SBS modified bitumen, self-adhering sheet membrane complete with thermoplastic film.
- C. Alternate self-adhering membrane for all window and window sill flashings, door openings, inside and outside corners and other transitions shall be a SBS modified bitumen, self-adhering sheet membrane complete with surface layer of metallic aluminum film that many sealants adhere well to.
- D. Liquid-applied flashing alternate to self-adhered flashing membranes for all window, door, MEP penetrations, inside/outside and dissimilar material connections shall be a moisture-curing single component STPe liquid-applied flashing compatible with a variety of substrates liquid and self-adhered air barrier membranes.
- E. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.
- F. Primer: Adhesive for self-adhering membranes at all temperatures shall be a synthetic rubber-based adhesive, quick setting.

- G. Joint Treatment, penetration and termination Sealant shall be sealant recommended by air membrane barrier manufacturer for intended use; a moisture cure, medium modulus polymer modified sealing compound.
- H. Insulation adhesive shall be recommended by air membrane barrier manufacturer for intended use; a synthetic, trowel applied, rubber-based adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify the substrate is in accordance with air barrier manufacturer requirements and as specified in this Section prior to installation of air barrier. Commencement of the Work or any parts thereof, indicates installer acceptance of the substrate.
 - 1. Acceptable substrates include exterior-grade gypsum sheathing, plywood, OSB, precast or cast-in-place concrete, CMU, primed steel, aluminum mill finish, anodized aluminum, and galvanized metal.
 - 2. Verify surfaces are sound, clean and free of frost, oil, grease, dirt, excess mortar or other contaminants.
 - 3. Substrate must be continuous and secure.
 - 4. Sheathing fasteners must be installed into solid backing and set flush with sheathing.
 - 5. Masonry joints must be struck flush. Allow fresh CMU mortar joints to cure for a minimum of thirty-six (36) hours.
 - 6. Tie holes/voids in poured concrete to be flush and smooth shall be filled. Allow new concrete to cure a minimum of sixteen (16) hours after forms are removed.
 - 7. Top and backside of substrate walls must be protected against bulk water during and after application of air barrier.
 - 8. Curing compounds must be resin based without oil, wax or pigments. Substrates must be free of form release agents.
- B. Notify contractor in writing of any conditions that are not acceptable.
- C. Do not apply air barrier assembly components until substrate and environmental conditions are in accordance with Air Barrier Manufacturer's published literature.

3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.
- G. Where curing compounds are used, they must be clear resin based without oil, wax or pigments.
- H. Do not proceed with application of air barrier membrane when rain is expected within 24 hours.
- I. Condition materials to room temperature prior to application to facilitate handling.
- J. New concrete should be cured for a minimum of 14 days and must be dry before air barrier membranes are applied.
- K. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

3.2 INSTALLATION

- A. Installation to be commence only after masonry ties have been installed.
- B. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- C. JOINT TREATMENT
 - 1. Seal joints $\frac{1}{4}$ inch and less between panels of exterior grade gypsum, gypsum sheathing, plywood, OSB or cementitious panels with joint treatment sealant over the face of the panel joint.
 - a. Apply sealant along the butt joint and trowel smooth to form a continuous layer over the joint extending $\frac{1}{2}$ inches on both sides to a uniform thickness of $\frac{1}{8}$ inch thick.
 - 2. Seal gaps and voids or irregular joints greater than $\frac{1}{4}$ inch between panels of exterior grade gypsum, gypsum sheathing, plywood, OSB or cementitious panels with a strip of self-adhered air/vapor barrier transition membrane lapped a minimum of 1-1/2 inches on both sides of the joint.

- a. Prime surfaces as per manufacturers' instructions and allow to dry.
 - b. Align and position self-adhering air/vapor barrier transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
 - c. Roll all laps and membrane with a counter top roller to ensure seal.
3. Alternately, joints not exceeding 1/8 inch can be sealed with yellow open weave glass fabric.
- a. Apply yellow open weave glass fabric centered over joint followed by a 1/8 inch (120mils) thick trowel application of air/vapor barrier membrane.
 - b. Allow to dry prior to application of primary air/vapor barrier membrane.

D. INSIDE AND OUTSIDE CORNERS

1. Seal inside and outside corners of sheathing boards with a strip of self-adhering air/vapor barrier transition membrane extending a minimum of 3 inches on either side of the corner detail.
 - a. Prime surfaces as per manufacturers' instructions and allow to dry.
 - b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
 - c. Roll all laps and membrane with a counter top roller to ensure seal.

E. LIQUID-APPLIED FLASHING OPTION

1. Use for door and window openings, MEP penetrations and dissimilar material connections.
 - a. Apply liquid flashing to all material joints and tool smooth.
 - b. Apply liquid flashing in a serpentine fashion to the entire window opening and tool smooth to a minimum 25 mils wet film thickness. Spread material to cover the inside of rough openings and extend 4 inches onto adjacent surfaces. Create a slight positive slope towards the exterior of sill conditions by applying more material to the interior side of sills to create a taper towards the exterior while maintaining a minimum 25 mils wet film thickness.
 - c. Apply liquid flashing to MEP penetrations with a maximum of 1/2 inch annular space. Extend liquid flashing a minimum 4 inches onto penetrating item and surrounding surfaces to a minimum of 25 mils dry film thickness.
 - d. Apply liquid flashing to inside/outside corners and dissimilar material connections. Extend a minimum 4 inches onto adjacent surfaces a minimum of 4 inches and a minimum wet film thickness of 25 mils dry film thickness.
 - e. Apply fluid-applied membrane air barrier onto liquid flashing a minimum of 2 inches.

F. TRANSITION AREAS

1. Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhered air/vapor barrier transition membrane.
 - a. Prime surfaces as per manufacturers' instructions and allow to dry.
 - b. Align and position self-adhering air/vapor barrier transition membrane, remove protective film and press firmly into place. Provide minimum 3 inch lap to all substrates.
 - c. Ensure minimum 2 inch overlap at all end and side laps of membrane.
 - d. Roll all laps and membrane with a counter top roller to ensure seal.

G. WINDOWS AND ROUGH OPENINGS

1. Window flashing materials are to be installed per the project construction documents or per industry standards including but not limited to ASTM E2112. Sheet or liquid applied window

flashing membrane shall extend a minimum of 3" onto face of wall. Sheet or liquid applied flashing membrane shall extend into the rough opening per the project construction documents and to sufficiently provide continuity between the fenestration and field of wall.

H. PRIMARY AIR / VAPOR BARRIER

1. Apply by spray or flat trowel a complete and continuous unbroken film of liquid air/vapor and rain barrier membrane to an approximate wet film thickness of 80 mils (47 mils dry).
 - a. For temperatures below 40 degrees F apply one component glycol-based air/vapor barrier membrane at a rate recommended by manufacturer.
2. Spray-apply or trowel around all projections and penetrations ensuring a complete and continuous air barrier membrane.
3. Allow air barrier membrane to dry as per manufacturers recommendations prior to placement of insulating materials.

I. Connect and seal exterior wall air-barrier material 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.

J. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

K. 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.

L. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 47 mils, applied in one or more equal coats.

M. Do not cover air barrier until it has been tested and inspected by testing agency.

N. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 INSTALLATION OF INSULATION

A. Coordinate with Cavity Wall Insulation Section 072100 for insulating materials.

B. Apply insulation adhesive in a serpentine pattern over the air barrier membrane.

1. Dab Method: Apply walnut-sized dabs of insulation adhesive spaced 6 inches on center to substrate. Apply insulation using sufficient hand pressure to compress dabs up to 2 inches in diameter.

2. Bead Method: Apply ¼ inch beads 6 inches on center in a serpentine pattern.

C. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.

3.4 FIELD QUALITY CONTROL

A. Final Observation and Verification:

1. Architect, General Contractor and Air Barrier Manufacturer to complete final observation of air barrier assembly as required by warranty

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

C. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements.

D. Tests: As determined by testing agency from among the following tests:

1. Air-barrier dry film thickness.

2. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.

3. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783.

4. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.

2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. As the Work proceeds, and upon completion, promptly clean up and remove from the premises all rubbish and surplus materials resulting from the foregoing Work.

B. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

C. Remove masking materials after installation.

D. Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.

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- E. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane. Drying time varies depending on temperature and relative humidity. Protect air barrier Work against wet weather conditions for a minimum of 24 hours.
- F. Clean soiled surfaces, spatters, and damage to adjacent areas caused by Work of this Section.
- G. Check area to ensure cleanliness and remove debris, equipment, and excess material from the site.

- H. Air barrier membranes are not designed for permanent exposure. Good practice calls for covering as soon as possible.

END OF SECTION 072726

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber-reinforced asphalt shingles.
 - 2. Hip and Ridge shingles
 - 3. Self-adhering ice and water barrier
 - 4. Underlayment materials.
 - 5. Ridge and roof vents.

1.2 PREINSTALLATION MEETINGS

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

1.3 RELATED SECTIONS

- A. Section 061000 - Rough Carpentry.
- B. Section 076200 - Sheet Metal Flashing and Trim.

1.4 REGULATORY REQUIREMENTS AND CERTIFICATIONS

- A. Provide a roofing system having an Underwriters Laboratories (UL) Class A fire resistance classification.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Asphalt shingles.
 - 2. Self- adhering ice and water barrier
 - 3. Underlayment materials.
 - 4. Roof vents.
 - 5. Asphalt roofing cement.
 - 6. Elastomeric flashing sealant.
- B. Samples: two (2) complete sets for each product and for each color and blend specified.

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1.6 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, ice and water barrier, and ventilation, by a single manufacturer.
- B. Installer Qualifications: Installer shall be licensed or otherwise authorized by all federal, state and local authorities to install all products specified in this section.
1. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.
 2. Installer shall follow manufacturer's published installation instructions.

1.9 WARRANTY

- A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
1. Materials Warranty Period: 50 years from date of Substantial Completion, prorated, with first 20 years non-prorated.
 2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 130 mph for 15 years from date of Substantial Completion.
 3. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.
 4. Workmanship Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

1. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.
2. Fire Resistance: UL Rating 790 and ASTM E108, Class A Fire Resistance

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES (AS-1)

- A. Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, and ASTM 3018 (Type-1) laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
1. Basis of design: Subject to compliance with requirements, provide "TruDefinition Duration" shingles by Owens-Corning or approved equal.

2. Butt Edge: Crenelated cut.
 3. Strip Size: Manufacturer's standard.
 4. Algae Resistance: Granules resist algae discoloration.
 5. Color and Blends: As selected by Architect from manufacturer's full range.
 6. Standards/Qualifications: ASTM D228, ASTM D3018 (Type 1), ASTM D3161 (Class F Wind Resistance), ASTM D3462, ASTM D7158 (Class H Wind Resistance), ASTM E108/UL 790 (Class A Fire Resistance), ICC-ES AC438, and PRI ER 1378E01.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.
- C. Starter Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 SELF-ADHERING UNDERLAYMENT MATERIALS

- A. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 55-mil-thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied. Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.
1. Subject to compliance with requirements, provide "WinterLock" by Owens-Corning, or an approved equal.
 - a. Granule skid resistant surface, self-adhering, self sealing, bituminous ice and water barrier.
 - b. Roll Width: 36 in (914 mm).
 - c. Selvage: 3 in (76 mm).
 - d. Standards/Qualifications: ASTM D1970, ASTM E108/UL 790 (Class A Fire Resistance¹), PRI ER 1378E02, Florida Product Approval, and Miami-Dade County Approval.

2.4 MECHANICALLY FASTENED UNDERLAYMENTS

- A. Fiberglas™ Reinforced Felt Underlayment.
1. Wrinkle resistant, water resistant, breather type cellulose/glass fiber composite roofing underlayment.
 - a. Roll Width: 36 in (91.4 cm).
 - b. Roll Length: 141.5 ft (43.1 m).
 - c. Coverage Per Roll: 4 roof squares.
 - d. Standards/Qualifications: ASTM D226 (Type II), ASTM D4869 (Type IV), ASTM D6757, ASTM E108/UL 790 (Class A Fire Resistance¹), and Florida Product Approval.
- B. Roof Vent: Manufacturer's standard, prefinished, galvanized metal roof vent for use to lap under shingles at sloped roofing areas.
1. Basis of Design Product: Subject to compliance with requirements, provide Owens Corning "VentSure® Low Profile Slant Back Roof Vent with exterior louver designed to evacuate hot and/or moisture-laden air from attics.
 - a. Each vent provides 72 sq in (46500 sq mm) NFVA.
 - b. Prefinished galvanized steel
 - c. 32 in (813 mm) by 23 in (584 mm) base, 11 in (279 mm) by 11 in (279 mm) opening.
 - d. Suitable on roofs with a 3:12 pitch or greater.
 2. Warranty: Manufacturer's standard 20 year warranty

3. Color Selection: As selected by Architect from manufacturer's full range

2.5 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.
- B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.
- C. Roofing Nails: Galvanized steel, stainless steel, or aluminum nails complying with ASTM F1667, minimum 12-gauge, 0.0808 in (2.05 mm) shank with 3/8 in (9.5 mm) diameter head. Check local building code requirements, and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/4 inch minimum through sheathing less than 3/4 inch thick.
 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- D. Underlayment Nails: manufacturer's recommended Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch-minimum diameter.

2.6 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise indicated on Drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean and remove from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.
- B. Prevent materials from entering and clogging roof drains, vents and conductors and from spilling or migrating onto surfaces of other construction.

3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Synthetic Underlayment:

1. Install on roof deck parallel with and starting at the eaves.
 - a. Lap sides and ends as recommended in writing by manufacturer, but not less than 2 inches for side laps and 6 inches for end laps.
 - b. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer, but not less than 72 inches.
 - c. Fasten with underlayment nails in accordance with manufacturer's written instructions.
 - d. Cover underlayment within period recommended in writing by manufacturer.
2. Install in single layer on roofs sloped at 4:12 and greater.
3. Install in lapped 2-ply, double layer on roofs sloped at less than 4:12.
4. Install synthetic underlayment over areas protected by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
 - a. Lap sides of underlayment over self-adhering sheet not less than 4 inches in direction to shed water.
 - b. Lap ends of underlayment not less than 6 inches over self-adhering sheet.
 - c. Do not cover self-adhering sheet with synthetic underlayment.
5. Terminate synthetic underlayment extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.

C. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck in locations indicated on Drawings.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.
 - a. Lap sides not less than 4 inches.
 - b. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
 - c. Roll laps with roller.
3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
4. Cover underlayment with asphalt shingles or weather proof tarps on same day. Do not leave exposed.

3.3 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and trim to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install metal flashings in accordance with recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.

B. Penetrations

1. Wrap all roof penetrations with ice and water barrier
 - a. Vent pipes: Install a 24 in (610 mm) square piece of self-adhering ice and water barrier lapping over roof deck underlayment; seal tightly to pipe.

- b. Vertical walls: Install self-adhering ice and water barrier extending at least 3 in to 4 in (76 mm to 102 mm) up the wall and 12 in (305 mm) onto the roof surface. Lap the membrane over the roof deck underlayment.

3.4 INSTALLATION OF ASPHALT SHINGLES

- A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
 1. Extend asphalt shingles 1/4 inch minimum over fasciae at eaves and rakes.
 2. Install starter strip along rake edge. Sealant strip should be closest to roof edge.
- C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses. Maintain uniform exposure of shingles at each succeeding course. Use of a chalk line every other course is recommended.
- D. Fasten asphalt shingle strips with a minimum of **six** roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.
 1. Locate fasteners in accordance with manufacturer's written instructions.
 2. All fasteners must be driven flush with the shingle surface and penetrate at least 3/4 in (19.1 mm) into the wood deck. Where the deck is less than 3/4 in (19.1 mm) thick, the fastener should be long enough to penetrate fully and extend 1/4" min. through the roof sheathing.
 3. When ambient temperature during installation is below 50 deg F, hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
- E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches beyond center of valley.
 1. Use one-piece shingle strips without joints in valley.
 2. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches short of valley centerline.
 3. Trim upper concealed corners of cut-back shingle strips.
 4. Do not nail asphalt shingles within 6 inches of valley center.
 5. Set trimmed, concealed-corner asphalt shingles in a 3-inch-wide bed of asphalt roofing cement.
- F. Ridge Vents: Install continuous ridge vents over asphalt shingles in accordance with manufacturer's written instructions.
 1. Ventilation at minimum must meet or exceed local building code requirements.
 2. Fasten with roofing nails of sufficient length to penetrate sheathing.
- G. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.

1. Fasten with roofing nails of sufficient length to penetrate sheathing.
2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.6 PROTECTION

- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 073113

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes standing-seam metal roof panels.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 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. Finish Warranty Period: 20 years minimum from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years minimum from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: As indicated on Drawings.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.
- F. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-90.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 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 weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

A. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels (MRP-1): Formed with vertical ribs at panel edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Peterson Aluminum Corp. "Snap-Clad" metal roof system or equal product by one of the following:

- a. AEP-Span.
- b. Architectural Building Components.
- c. Architectural Metal Systems.
- d. Architectural Roofing and Siding, Inc.
- e. Berridge Manufacturing Company.
- f. CENTRIA Architectural Systems.
- g. Copper Sales, Inc.
- h. Fabral.
- i. Metal-Fab Manufacturing, LLC.
- j. Metecno-Morin; Division of Metecno Inc.
- k. Steelo Systems, L.L.C.
- l. United Steel Deck Inc.; Subsidiary of Bouras Industries Inc

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

- a. Nominal Thickness: 24 gauge.
- b. Exterior Finish: Two-coat fluoropolymer.
- c. Color: Refer to Material Finish / Color Schedule section 000200.

3. Clips: High Performance clip to accommodate thermal movement.

- a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Joint Type: As standard with manufacturer.
5. Panel Coverage: 16 inches.
6. Panel Height: 1.75 inches.
7. Stiffener Beads: Provide each panel with (2) stiffener beads.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
 3. Basis-of-Design Product: Subject to compliance with requirements, provide Grace Construction Products; W.R. Grace & Co. -- Conn.; "Grace Ice and Water Shield HT" or a comparable product by one of the following:
 - a. Carlisle Residential; a division of Carlisle Construction Materials.
 - b. Drexel Metals.
 - c. Henry Company.
 - d. Kirsch Building Products, LLC.
 - e. Owens Corning.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch (1.2-mm) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
- E. Vented Ridge: Use standing seam metal roof panel manufacturers' standard ridge vent detail. PAC-CLAD's detail shown on drawing 1 on sheet A3-32. If an alternate roof manufacturer is used, contractor shall be responsible for performing new roof venting calculations and submitting to the architect for review.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Roof panels to be continuous with no joints.
- E. 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.
- F. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.6 FINISHES

A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below and on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

- A. 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. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. 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.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. 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.

3.4 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.

END OF SECTION 074113.16

SECTION 074213.53 - METAL SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes metal vented soffit panels.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type and color of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
1. Wind Loads: As indicated on Drawings.
 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METAL SOFFIT PANELS

- A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
1. Basis of Design Product: Subject to compliance with requirements, provide products indicated in Metal Soffit Panel Types specified below by Peterson Aluminum Corporation or an approved equal by one of the following:
 - a. Architectural Building Components.
 - b. Architectural Metal Systems.
 - c. Berridge Manufacturing Company.
 - d. CENTRIA Architectural Systems.
 - e. Firestone Building Products; Una-Clad
 - f. Metal-Fab Manufacturing, L.L.C.

2.3 METAL SOFFIT PANEL TYPES (MSP-1)

- A. Metal Soffit Panel (MSP-1):
1. Peterson Aluminum Corporation 'PAC-750, Soffit Panels – Fully vented.
 2. Panel Width: 12-inch
 3. Panel Depth: 1/2-inch
 4. Material: Aluminum, with "vee" grooves at 6" centers.
 5. Panel Length: Continuous lengths without seams.
 6. Material: Aluminum Sheet: Coil-coated .032 sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 7. Exterior Finish: Two-coat fluoropolymer.
 8. Color: Refer to Material Finish / Color Schedule section 000200.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/8 inch (3 mm) thick.
 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. 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.

2.6 FINISHES

- A. Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: [AAMA 621] [AAMA 2605]. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 - 3. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
 - 1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.2 METAL SOFFIT PANEL INSTALLATION

- A. Metal Soffit Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Apply panels and associated items true to line for neat and weathertight enclosure.

2. 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.

B. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING 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.

END OF SECTION 074213.53

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Adhered polyvinyl-chloride (PVC) roofing system.
 - 2. Roof insulation.
 - 3. Coverboards

1.2 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For the following products:
 - 1. Sheet roofing, of color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

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1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain components including roof insulation, and fasteners for roofing system from 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. Roofing system shall be designed to accommodate ASCE 7-10 windspeeds of 120 mph; risk category IV.
- D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.86 and an emissivity of not less than 0.82 when tested according to CRRC-1.
- F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 PVC ROOFING

- A. PVC Sheet: ASTM D 4434/D 4434M, Type III, fabric reinforced and fabric backed.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec; "Sure-Flex PVC membrane-60 Mil" or a comparable product by one of the following:
 - a. Duro-Last Roofing, Inc.
 - b. Flex Membranes International.
 - c. GAF Materials Corporation.
 - d. Johns-Manville
 - 2. Thickness: 60 mils (1.5 mm), nominal.
 - 3. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- E. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces. Minimum of two (2) layers.
 - 1. Thickness: 2.5" thick minimum.
 - 2. Minimum R-Value: 14.4.
 - 3. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec Incorporated, InsulBase PolyIso, 2.5" thick or a comparable product by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Firestone Building Products.
 - c. GAF Materials Corporation.

- d. Johns Manville.
 - e. Rmax, Inc.
- B. Tapered Insulation: Provide factory-tapered insulation boards of same type and by same manufacturer as base insulation, fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

- A. 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 cover board to substrate or to another insulation layer.

2.7 COVER BOARDS

- A. Cover Board @ flat roofs (except Training Tower): ASTM C 1289, Type II, Class 4, Grade 1, high density polyisocyanurate board with coated fiber glass reinforced facers, 1/2 inch (6 mm) thick.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle SynTec Incorporated; "SecurShield HD PolyIso Cover Board" or a comparable product by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Firestone Building Products.
 - c. GAF Materials Corporation.
 - d. Georgia-Pacific
 - e. Insulfoam LLC; a Carlisle company.
 - f. Johns Manville.
 - g. Rmax, Inc.
 2. Properties
 - a. Thickness: 1/2 inch (6 mm) thick.
 - b. Weight: 0.0343 lbs./sf
 - c. Surfacing: Coated Fiberglass Mat face sheets
 - d. Compressive Strength; ASTM D1621: Nominal 109 pounds per square inch.
 - e. Dimensional Stability: ASTM D2126: <0.5% linear change (7 days).
 - f. Water Absorption: ASTM C209: < 1% volume.
 - g. R-Value ASTM C518: 2.5
 - h. Resistance to Mold: ASTM D3273: Pass
 - i. Fire resistance rating: UL 790, Class A; FM 4450/4470, Class 1.
- B. Cover Board @ Roof beneath Paver System: ASTM C 1177, fiberglass mat faced gypsum roof boards, 1/2 inch (6 mm) thick.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia-Pacific "DensDeck Prime" fiberglass-mat faced gypsum roof boards, or a comparable product by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Carlisle
 - c. Firestone Building Products.
 - d. GAF Materials Corporation.
 - e. Insulfoam LLC; a Carlisle company.
 - f. Johns Manville.
 - g. Rmax, Inc.

2. Properties
 - a. Thickness: 1/2 inch (6 mm) thick
 - b. Weight: 2.0 lb/sq. ft..
 - c. Surfacing: Primed Fiberglass Mat.
 - d. Flexural Strength, Parallel (ASTM C473): 80 lbf, minimum.
 - e. Flute Span (ASTM E661): 5 inches.
 - f. Permeance (ASTM E96): Greater than 23 perms.
 - g. R-Value (ASTM C518): 0.56.
 - h. Water Absorption (ASTM C473): Less than 5 percent of weight.
 - i. Surface Water Absorption (ASTM C473): Nominal 1.0 grams.
 - j. Compressive Strength (Applicable Sections of ASTM C472):
 - 1) Nominal 900 pounds per square inch.
 - k. Flame Spread/ Smoke Development (ASTM E84):
 - a) Not more than 0 Flame Spread, 0 Smoke Development
 - l. Combustibility (ASTM E136): Noncombustible
 - m. Fire resistance rating (UL 790 and ASTM E108): Class A
 - n. Mold Resistance (ASTM D3273): Scored a 10

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.

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.2 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- D. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- E. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Set cover board in manufacturer recommended adhesive, firmly pressing and maintaining cover board in place.

3.3 ADHERED ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
 - 1. Install sheet according to ASTM D 5036.
- B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.
- D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.4 BASE FLASHING INSTALLATION

- A. Install sheet flashings and 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.

3.5 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.6 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075419

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Manufactured reglets and counterflashing.
 2. Formed roof-drainage sheet metal fabrications.
 3. Formed low-slope roof sheet metal fabrications.
 4. Formed steep-slope roof sheet metal fabrications.
 5. Cast Iron downspout drainage boot.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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.
- D. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- B. Preinstallation Conference: Conduct conference at Project site.
- C. 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.
- D. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
1. Build mockup of typical roof edge, including fascia, fascia trim, metal panel and other detailed accessories, approximately 10 feet (3.0 m) long.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. 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 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2B (bright, cold rolled) finish.
- C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) 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. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.
- C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and 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. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - b. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 MANUFACTURED REGLETS

- A. Reglets: Units of type, material, and profile indicated, 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. Material: Stainless steel, 0.019 inch (0.48 mm) thick.

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 without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed 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 (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
 - 1. Fabricate from the following materials:
 - a. Galvanized Steel: 0.022 inch (0.56 mm) thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
 - 1. Fabricate from the Following Materials:
 - a. Galvanized Steel: 0.034 inch thick (22 gauge).
- B. Base Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick (24 gauge).
- C. Counterflashing and Flashing Receivers: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick (24 gauge).
- E. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.

2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- B. Valley Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.
- C. Drip Edges: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm).
- D. Eave, Rake and Ridge Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

2.10 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, at shelf angles, and where indicated. Fabricate

discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams where flashing is discontinuous. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch (0.40 mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

2.11 CAST IRON DOWNSPOUT DRAINAGE BOOT

A. Cast Iron Downspout Drainage Boot: Basis of Design - Provide "Zurn" cast iron downspout drainage boot at all downspout locations (or similar type from J.R Hoe and Sons or other approved equal). Drainage boot to have integral cleanout access port and cast iron strap for screw attachment to vertical wall surface. Choose item below, based on downspout sizes.

1. Zurn "Z192-CA-G"
a. Size: 4"x3"x24" deep.
b. Galvanized cast iron.

2. Zurn "Z191-CA-G"
a. Size: 5"x4"x24" deep.
b. Galvanized cast iron.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. 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 (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). 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 so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, 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 and levels indicated. 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 (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) 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 079200 "Joint Sealants."

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints. 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 (15.24 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
 - 1. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- D. 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 (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.
- E. 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 SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 4 Section "Unit Masonry Assemblies."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rooftop Equipment Curbs

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
- B. Shop Drawings: For roof accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 EQUIPMENT SUPPORTS

- A. Equipment Supports: Internally reinforced Rail-type metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded corner joints, stepped integral metal cant raised the thickness of roof insulation, and integrally formed structure-mounting flange at bottom.
- B. Basis of Design: Subject to compliance with requirements, provide "Pate, ES-5 Equipment Curbs" or approved equal by one of the following:
 - 1. Buckley Associates
 - 2. Greenheck
 - 3. Roof Products, Inc
 - 4. Thybar
- C. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

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- D. Material: Heavy gauge Zinc-coated (galvanized) steel sheet, 0.052 inch (1.32 mm) minimum thick.
 - 1. Finish: Mill phosphatized.
- E. Construction:
 - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
 - 2. Nailer: Factory-installed continuous wood nailers 3-1/2 inches (90 mm) wide on top flange of equipment supports.
 - 3. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
 - 4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
 - 5. Fabricate equipment supports to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
 - 6. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

2.2 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation[and mill phosphatized for field painting where indicated].
 - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness 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 (38 mm) thick.
- D. 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:
- E. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, 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.
- C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM 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. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 077253 - SNOW GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rail-type, seam-mounted snow guards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
 - 1. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacings, and finish.
- C. Samples.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Structural Performance:
 - 1. Snow Loads: 30 psf.
- C. Seam-Mounted, Rail-Type Snow Guards:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide S-5! Attachment Solutions; Metal Roof Innovations, Ltd.; "Color Guard" or a comparable product by one of the following:
 - a. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.

- b. LMCurbs.
 - c. Sno-Gem, Inc.
 - d. Snow Management Systems.
2. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with one rail with color-matching inserts of material and finish used for metal roofing.
3. Material: Aluminum
4. Finish: Fluoropolymer painted finish. Refer to Section 000200.
- a. Color: As selected by Architect from manufacturer's full color line to match roofing panels.
5. Components:
- a. Clamps: Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards and Data.
 - 1) Type: As recommended by manufacturer for standing seam roofing type.
 - b. Set screws: 300 Series stainless steel, 18-8 alloy, 3/8 inch diameter, with round nose point.
 - c. Attachment bolts: 300 Series stainless steel, 18-8 alloy, 8 mm or 10 mm diameter, hex flange bolt.
 - d. Cross Members: Manufactured from 6061-T6 or 6005-T5 alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data.
 - 1) Receptacle in face to receive color-matched metal strips.
 - 2) Provide splice connectors ensuring alignment and structural continuity at end joints.
 - e. Color Strips: Same material and finish as roof panels; obtained from roof panel manufacturer.
 - f. Snow and Ice Clips: Aluminum, with rubber foot, minimum 3 inches wide.
 - 1) Type: As recommended to accommodate standing seam height and type.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

3.2 INSTALLATION

- A. Install snow guards according to manufacturer's written instructions. Space rows as recommended by manufacturer.
- B. Attachment for Standing-Seam Metal Roofing:
 - 1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.
 - 2. Seam-Mounted, Rail-Type Snow Guards: Aluminum clamps attached to vertical ribs of standing-seam metal roof panels.
- C. Snow and Ice Clips:
 - 1. Install at each panel, between standing seams in roofing. Attach to cross members.

END OF SECTION 077253

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. All penetrations through corridor walls, corridor ceilings, storage rooms or other fire rated walls (as determined by Architect) shall be fire-stopped.

1.2 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft (0.01524cu. m/s x sq. m) at both ambient temperatures and 400 deg F (204 deg C).
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with

modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

- C. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
- D. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- E. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and Fire Marshal, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule or on Drawings that are produced by one of the following manufacturers:
 - 1. Grace, W. R. & Co. - Conn.
 - 2. Hilti, Inc.
 - 3. 3M; Fire Protection Products Division.

2.2 FIRESTOPPING

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

PART 3 - EXECUTION

3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

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- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestop Systems for Metallic Pipes, Conduit, or Tubing :
 - 1. UL-Classified Systems: W-L 1036.
- C. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing :
 - 1. UL-Classified Systems: W-L 2097.
- D. Firestop Systems for Electrical Cables :
 - 1. UL-Classified Systems: W-L 3081.
- E. Firestop Systems for Cable Trays :
 - 1. UL-Classified Systems: W-L 4004.
- F. Firestop Systems for Insulated Pipes:
 - 1. UL-Classified Systems: W-L 5053.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire-resistive joint systems for the following:
 - 1. Bottom-of-Wall joints.
 - 2. Head-of-wall joints.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.
- B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
 - 1. Load-bearing capabilities as determined by evaluation during the time of test.
- C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 3, as determined by NFPA 285 and UL 2079.
 - 1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
- D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: For each fire-resistive joint system.
- C. Qualification Data: For Installer.
- D. Field quality-control test reports.
- E. Research/Evaluation Reports: For each type of fire-resistive joint system.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
 - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.
- D. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- E. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.
- B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.
 - 1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.
- D. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.3 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.
- B. Bottom-of-Wall Fire-Resistive Joint Systems (FRJS-1):
 - 1. UL-Classified Systems: BW-S-0001; Hilti CP601S Elastomeric Firestop Sealant or equal.
 - 2. Assembly Rating: 2 hours.
 - 3. Nominal Joint Width: $\frac{3}{4}$ inch maximum.
 - 4. L-Rating at Ambient: Less than 1 cfm/lin. ft.
 - 5. L-Rating at 400 deg F (204 deg C): Less than 1 cfm/lin. ft.
- C. Head-of-Wall Fire-Resistive Joint Systems (FRJS-2):
 - 1. UL-Classified Systems: HW-D-0024; Passive Fire Protection Partners #4100NS or equal.
 - 2. Assembly Rating: 2 hours.
 - 3. Nominal Joint Width: $\frac{3}{4}$ inch maximum.
 - 4. Movement Capabilities: Class II – 33 percent compression or extension.

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5. L-Rating at Ambient: Less than 1 cfm/lin. ft.
6. L-Rating at 400 deg F (204 deg C): Less than 1 cfm/lin. ft.

D. Head-of-Wall Fire-Resistive Joint Systems (FRJS-3):

1. UL-Classified Systems: HW-D-0031; 3M Firedam Spray 100 or equal.
2. Assembly Rating: 2 hours.
3. Joint Width: 2 inches maximum.
4. Movement Capabilities: Class II - 25 percent compression or extension.
5. L-Rating at Ambient: Less than 1 cfm/lin. ft.
6. L-Rating at 400 deg F (204 deg C): Less than 1 cfm/lin. ft.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Latex joint sealants.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates for both exterior and interior applications.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Compatibility and adhesion test reports.

1.4 QUALITY ASSURANCE

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
- C.
1. Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.

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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.
- B. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.
- a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.

- C. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
- a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.
- D. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
- a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.

2.4 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
- a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.
- B. Silicone, S, NS, 50, NT: 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.
- a. BASF Corporation-Construction Systems.
 - b. Pecora Corporation.
 - c. Polymeric Systems, Inc.
 - d. Sika Corporation.
 - e. Tremco Incorporated.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- B. 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.
 - c. Soudal USA.
 - d. Tremco Incorporated.

2.6 LATEX JOINT SEALANTS

- A. 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. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.
 - d. Tremco Incorporated.

2.7 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint

substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
 - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 2. Remove laitance and form-release agents from concrete.
 - a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, M, P, 50, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 100/50, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
 - a. Custom color to be used at brick veneer.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in tile flooring.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, P, 25, T, 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.
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, walls and partitions.
 - d. Other joints as indicated on Drawings.
2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Owner 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.
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 and windows.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Owner from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
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 Owner from manufacturer's full range of colors

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames for masonry walls.
2. Interior standard steel doors and frames for stud walls.
3. Interior sidelite and borrowed light frames.
4. Light frames for glazing installed in hollow metal doors.

1.2 Related Sections:

- A. Division 08 Section "Flush Wood Doors".
- B. Division 08 Section "Ballistic Rated Wood Door and Frame Assemblies
- C. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
- D. Division 08 Section "Door Hardware".
- E. Division 09 Section "Interior Painting" for field painting interior hollow metal doors and frames.

1.3 REFERENCES

A. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.

16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.4 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
 - 9. Details of conduit and preparations for power, signal, and control systems.
- D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
- E. Samples for Verification:
 - 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.6 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.10 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.11 PREINSTALLATION MEETINGS

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

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

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1.13 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. 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.

2.2 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. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Dean Steel
 - 4. DCI Hollow Metal.
 - 5. DeLa Fontaine Steel Doors & Frames.
 - 6. Kewanee Corporation (The).
 - 7. Mesker Door.
 - 8. Pioneer
 - 9. Republic Doors and Frames.
 - 10. Steelcraft; an Allegion brand.

2.3 HOLLOW METAL DOORS AND FRAMES - GENERAL

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Interior Doors: Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

- C. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

2.4 INTERIOR HOLLOW METAL DOORS

A. Interior Doors:

1. Type: As indicated in the Door and Frame Schedule.

- B. Basis of Design: Subject to compliance with requirements, provide doors as manufactured by Curries Company (CU) - 747 Series or equal products by the following:

1. Ceco Door.
2. Curries Company.
3. Dean Steel.
4. DCI Hollow Metal.
5. DeLa Fontaine Steel Doors & Frames.
6. Kewanee Corporation (The).
7. Mesker Door.
8. Pioneer.
9. Republic Doors and Frames.
10. Steelcraft.

C. Design: Flush panel, seamless

1. Type: As indicated in the Door and Frame Schedule.
2. Thickness: 1-3/4 inches (44.5 mm).
3. Face: un-coated steel sheet.
 - a. Minimum thickness minimum 16 gauge (0.053 inch (1.3 mm).
 - b. At locations as indicated on drawings, provide metallic-coated steel sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 or A60 metallic coating.
4. Edge Construction: Model 2, Seamless.
5. Core Construction: Manufacturer's standard vertical steel-stiffener core. Minimum 22 gauge steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 6" on centers. Spaces between stiffeners filled with fiberglass insulation (minimum density 0.8#/cubic ft.).
6. Vertical Edges: Seamless: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
7. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
8. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
9. Fire rated doors: Fabricate doors in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
10. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
11. Exposed Finish: Prime

2.5 INTERIOR HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Type: As indicated in the Door and Frame Schedule.
- C. Basis of Design: Subject to compliance with requirements, provide frames as manufactured by Curries Company (CU) - CM Series or equal products by the following:
 - 1. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Dean Steel
 - 4. DCI Hollow Metal.
 - 5. DeLa Fontaine Steel Doors & Frames.
 - 6. Kewanee Corporation (The).
 - 7. Mesker Door.
 - 8. Pioneer
 - 9. Republic Doors and Frames.
 - 10. Steelcraft; an Allegion brand.
- D. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 1. Materials: un-coated steel sheet.
 - a. Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet for door openings up to 48 inches in width.
 - b. Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet for door openings greater than 48 inches in width.
 - c. At locations as indicated on drawings, provide metallic-coated steel sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
 - 2. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - 3. Construction: Full profile welded.
 - 4. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
 - 5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 INTERIOR BORROWED LITES

- A. Fabricate of un-coated steel sheet, with a minimum thickness matching that of door frames.
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

E. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.8 LIGHT OPENINGS AND GLAZING

A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.

- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.9 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding.

2.10 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B, with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Provided galvanized doors and frames for openings as indicated in Door/Opening Schedule on drawings.
 - 1. Materials: Metallic-coated steel sheet, with minimum G60 Hot-dip galvanized coating in accordance with ASTM A153/A153M
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- H. Glazing: Comply with requirements in Section 088000 "Glazing."
- I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.11 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 thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
2. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
3. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".

D. Hollow-Metal Frames:

1. Fabricate in one piece except where handling and shipping limitations require multiple sections.
2. Shipping Limitations: 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.
3. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening
4. 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 welding.
5. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
6. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
7. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
8. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
10. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry 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) 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 1 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 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

- 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
 12. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/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 BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- F. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 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. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.12 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

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. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 - 3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 5. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
 - 6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

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- 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.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 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 and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.
3. Factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Factory-machining criteria.
6. Factory finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
4. Dimensions and locations of blocking for hardware attachment.
5. Clearances and undercuts.
6. Requirements for veneer matching.

C. Samples: For factory-finished doors.

1.3 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with "Architectural Woodwork Standards" and ANSI/WDMA I.S. 1A.

2.3 SOLID-CORE, FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors:
 - 1. Basis of Design: Subject to compliance with requirements, provide "Aspiro Series" Pre-finished wood doors by Masonite Architectural or equal product by one of the following:
 - a. Ampco, Inc.
 - b. Buell Door Company Inc.
 - c. Eggers Industries
 - d. Graham; an Assa Abloy Group company.
 - e. Ideal Architectural Doors & Plywood.
 - f. Oshkosh Architectural Door Company.
 - g. Vancouver Door Company.
 - h. VT Industries Inc.
 - 2. Performance Grade:
 - a. ANSI/WDMA I.S. 1A Extra Heavy Duty in all areas.
 - 3. ANSI/WDMA I.S. 1A Grade: Premium, with Grade AA faces.
 - 4. Faces: Single-ply wood veneer not less than 1/50 inch (0.508 mm) thick.
 - a. Species: White Maple.
 - b. Cut: Plain Sliced.
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

- f. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet (3 m) or more.
5. Exposed Vertical Edges: Same species as faces - Architectural Woodwork Standards edge Type A.
- a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
6. Core for Non-Fire-Rated Doors:
- a. WDMA I.S. 10 structural composite lumber.
 - 1) Screw Withdrawal, Face: 550 lbf (2440 N).
 - 2) Screw Withdrawal, Edge: 550 lbf (2440 N).
7. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
- a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as follows:
 - 1) 5-inch (125-mm) top-rail blocking.
 - 2) 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - 3) 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - 4) 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
8. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
- 1. Wood Species: Same species as door faces.
 - 2. Profile: Flush rectangular beads.
 - 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
- C. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 2. Finish faces, all four edges, edges of cutouts, and mortises.
- B. Factory finish doors. Colors: As identified in section 000200.
- C. Transparent Finish:
 - 1. ANSI/WDMA I.S. 1A Grade: Premium.
 - 2. Finish: ANSI/WDMA I.S. 1A TR-8 UV Cured Acrylated Polyester/Urethane.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."

- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
 - 1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
 - 2. Install fire-rated doors in accordance with NFPA 80.
 - 3. Install smoke- and draft-control doors in accordance with NFPA 105.
- D. Job-Fitted Doors:
 - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.2 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of access door and frame and for each finish specified.
- C. Product Schedule: For access doors and frames.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges:
 - 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. Acudor Products, Inc.
 - b. Babcock-Davis.
 - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - d. Karp Associates, Inc.
 - e. Larsens Manufacturing Company.
 - f. MIFAB, Inc.
 - g. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - h. Nystrom, Inc.
 - 1. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 - 2. Locations: Wall and ceilings.
 - 3. Material: Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
 - 4. Frame Material: Same material and thickness as door.
 - 5. Hinge: Continuous piano hinge

6. Latch and Lock: Cam latch, screwdriver operated.

B. Flush Access Doors with Exposed Flanges:

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. Acudor Products, Inc.
 - b. Babcock-Davis.
 - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - d. Karp Associates, Inc.
 - e. Larsens Manufacturing Company.
 - f. MIFAB, Inc.
 - g. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - h. Nystrom, Inc.
2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Wall and ceilings in masonry.
4. Material: Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed.
5. Frame Material: Same material, thickness, and finish as door.
6. Hinge: Continuous piano hinge
7. Latch and Lock: Cam latch, screwdriver operated.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. 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.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Frame Anchors: Same material as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. 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.
- B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

C. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.5 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 - a. Color: Paint to match adjacent wall or ceiling finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083453 - BALLISTIC RATED WOOD DOOR AND FRAME ASSEMBLY

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Ballistic rated divided lite wood door and frame assembly.
- B. Preparation for field finishing flush wood doors.
- C. Factory machining for hardware.

1.2 REFERENCES

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment.
- B. ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door, frame and glass including manufacturer recommended installation instructions.
 - 1. Door core materials and construction, edge construction, veneer, face type and characteristics, and trim.
 - 2. Frame materials and construction.
 - 3. Factory-machining criteria.
- B. Shop Drawings: Indicate location, size, hand and elevation of each type of door and frame; attachment to other work, construction details not covered in Product Data; and the following:
 - 1. Door schedule indicating door location, type, size, protection rating, and swing.
 - 2. Door and frame elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
 - 3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - 4. Dimensions and locations of blocking for hardware attachment.
 - 5. Clearances and undercuts.
- C. Samples:
 - 1. Selection samples: Wood Doors: For preliminary veneer selection for each exposed finish.
 - 2. Final sample: Wood Doors: For final veneer selection for each exposed finish.
 - 3. Glazing: For each type of glass.

1.4 INFORMATION SUBMITTALS

- A. Product Test Reports: Indicating compliance with requirements.
- B. Warranty: Sample of manufacturer's standard warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site with the manufacturer's UL Listed Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations provided by manufacturer. Do not install products stored in conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Workmanship Warranty: All materials shall be warranted against defects for a period of one (1) year for the date of receipt at the project site. Provide certificates of manufacturer's standard limited warranty with closeout documents.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Basis of Design:

1. Subject to compliance with requirements, provide TSS Bullet Resistant, Wood Divided Lite Door and Frame Assembly as manufactured by Total Security Solutions, Inc., 935 Garden Lane, Fowlerville, MI 48836, 866 734-6277. Attn: Sales Department, sales@tssbulletproof.com. Web: www.tssbulletproof.com
2. Subject to compliance with requirements, equivalent products by following manufacturers may be acceptable if approved in accordance with Section 012500 Substitution Procedures.
 - a. Ambico Limited
 - b. Covenant Security Equipment
 - c. North American Bullet Proof
 - d. Oshkosk Door Company

B. Design Performance:

1. Through the design, manufacturing techniques and material application the bullet resistant wood divided lite door and frame assembly shall be constructed of a wood core lined with a sheet of fiberglass.
 - a. Wood Species: Hard Maple
2. Door assembly to have no exposed fasteners.
3. Joint connections to have concealed clips to provide rigid assembly when installed.
4. Frames shall be bullet resistant rated, to same level as door.
5. All joints and connections shall be tight, providing hairline points and true alignment of adjacent members.
6. Door assembly swing: as indicated on drawings.

- C. Door and Frame Assembly Dimensions: As indicated on the Drawings.
- D. Door and Frame Performance:
1. Standard door and frame assembly to defeat ballistic assaults from 9mm medium power through 7.62 Rifle as tested with UL Standard 752 at Underwriters Laboratories, Level 3.
 2. Door Size: as indicated on drawings.
 3. Frame Construction:
 - a. Welded hollow metal frame, primed painted in fabrication.
 - b. Bullet resistant rated: Level 3.
- E. Door Hardware:
1. Hinges: Heavy Duty continuous hinge, clear anodized coating.
 2. Coordinate with hardware supplier and factory prepare door to receive balance of door hardware. Balance of door hardware to be provided and installed separately by Owner.
- F. Factory-Applied Finish:
1. Frame:
 - a. Prime painted, prepared for field painting by others.
 2. Door:
 - a. Wood Veneer: Hard Maple.
 - b. Stain and transparent finish in field by others as specified in Division 9.
- G. Bullet-Resistant Glazing: Level 3 in accordance with UL 752.
1. Glazing: Laminated polycarbonate, 1-1/4 inch poly/acrylic, Level 3
 - a. 1/8 inch mar-resistant polycarbonate over a 0.25 inch urethane on both sides of a 1 inch clear acrylic core.
 - b. UL 752 –Testing for Ballistic Resistance for the complete assembly including framing and panels.
 - c. Properties:
 - 1) Protection: UL Level 3 – 0.44 mag
 - 2) Ballistic Data: Velocity 1: 1350 ft/s; Velocity 2: 1485 ft/s
 - 3) Shots: Three
 - 4) Light Transmission: 77%
 - 5) Nominal Thickness: 1.25 inch
 - 6) Weight: 7.7 lbs/sg. ft.
 - 7) Dimensional Tolerance: ASTM C1349
- H. Field alterations to the construction of the assembly fabricated under the acceptable standards are not allowed unless approved in writing by the manufacturer and the Architect.
- I. Standard manufacturing tolerances +/- 1/16" shall be maintained.

2.2 FABRICATION

- A. Units shall be completely shop-fabricated by manufacturer ready for installation.
- B. Tolerances: All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members;
 - A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
 - B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 - C. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to beginning installation, verify that all supports have been installed as required by the Contract Documents and architectural drawings, and Shop Drawings have been approved.
- B. Notify Architect of any unsatisfactory preparation that is responsibility of others.
- C. Clean and prepare all surfaces per manufacturers recommendations as required for achieving the best results for the substrate under the project conditions.
- D. Verify field dimensions of openings prior to fabrication of framing.
- E. Coordinate structural requirements to ensure proper attachment and support.
- F. Do not begin installation of material until all unsatisfactory conditions have been resolved and approved by Architect.

3.2 INSTALLATION

- A. Bullet Resistant Wood Door and Frame Assembly can be installed using, industrial adhesive, mastic, screws and bolts. Method of application shall maintain bullet resistive rating at junctures with concrete floor, door and window frames and other penetrations.
- B. Maintain installation tolerance to not exceed 1/16th for squareness, alignment, twist and plumb. Install hardware as specified per manufacturer's instructions.
- C. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings.
- D. All products shall be installed per installation instructions provided by manufacturer.
- E. Door and frame assembly shall arrive on site completely pre-fabricated to field dimensions approved by Shop Drawings.
- F. Install framing and secure to structure in accordance with manufacturer's recommendations and approved shop drawings.

3.3 PROTECTION

- A. Clean and protect door and frame assembly from damage during ongoing construction operations. If damage occurs, remove and replace as required to provide assembly in their original, undamaged condition.
- B. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements.
- C. Provide final cleaning of product and accessories, removing excess dust, labels and protective covers.
- D. Touch-up, repair or replace damaged products prior to Substantial Completion.

END OF SECTION 083453

SECTION 083500 – FOUR-FOLD DOORS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:

1. Four-Fold Doors
 - a. Provide all labor, equipment, materials and services required to execute and complete all items of work in connection with furnishing and installing the four-fold doors, including the tubular mounting frames described herein. All work shall be in accordance with the specifications and drawings.

1.2 REFERENCES

1. AWS - American welding society
2. AISC – American Institute of Steel Construction
3. NFPA 70 - National Fire Protection Association 2002
4. NEMA MG1- Motors and Generators; National Electrical Manufacturers Association 1998

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS:

- A. Product Data: Provide product literature supporting compliance of the product with specified requirements
- B. Submit detailed shop drawings of all work, and list the location in the building for each door. Clearly show and describe in detail, detailed door assemblies, and adjacent construction, including elevations, sections, and details of door, track, hardware, and operating components, dimensions, finishes and relationship of door, frames, track, hardware and operating components to adjacent construction.

1.5 INFORMATIONAL SUBMITTALS:

- A. Product Test Reports
- B. Warranties: Samples of special warranties

1.6 CLOSEOUT SUBMITTALS:

- A. Submit printed operation instructions and maintenance data for the doors as follows:
 1. Wiring diagrams: “as built” straight line wiring and schematic diagrams showing electrical connections and control circuitry.
 2. Instructions showing operation.
 3. Lubrication chart indicating lubrication points and type of lubricant recommended for equipment.

1.7 QUALITY ASSURANCE

- A. Steel frames shall be designed in accordance with AISC" Steel Construction Manual"
- B. Installation work shall only be carried out by the unit manufacturer or by an approved installation specialist approved by the unit manufacturer.
- C. Source Limitations: Obtain four-fold doors through one source from a single manufacturer.
 - 1. Obtain operators and controls from the four-fold door manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 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. Finish Warranty Period: Ten years from date of Substantial Completion

1.7 REQUIREMENTS OF REGULATORY AGENCIES

- A. Equipment and installation shall comply with local, state and federal laws and other mandatory requirements. Be responsible to insure an installation which is in compliance with such laws and regulations and all changes or alterations required by the authorized inspector or the authority having jurisdiction to be made without increase of subcontract price. Systems shall bear labeling for electrical equipment from the following standards;
 - 1. Underwriters Laboratory 508 electrical standards.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

- 1. Delivery- deliver materials to job site in wooden crates with proper packing materials protecting the finish of the door and with packaging labels
- 2. Handle components with care. Protect against damage, dirt, disfigurement and weather.
- 3. Protect other work resulting from work of this section. Replace work, which cannot be satisfactorily repaired or restored at no additional cost to the owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide UL labels on applicable devices.

- A. Structural Performance: Provide four-fold doors, supporting components, and operating mechanism shall be capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components. Steel frames shall be designed in accordance with AISC Steel Construction Manual.
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (1.0 Kpa) acting inward and outward.
 - 2. Maximum Deflection: 1/120 of the total span
 - 3. Maximum Stress: 27,000 psi
- B. Operation-Cycle Requirements: Design four-fold door components and operator to operate for not less than 100,000 cycles.

2.2 MANUFACTURERS AND PRODUCTS

- A. Basis of Design Product: Subject to compliance with requirements, provide International Door, Inc., (734) 459-3000, Model #FF400-FR-DSI, four-fold door or approved equal by one of the following manufacturers:
 - 1. Door Engineering, A Senneca Company
 - 2. Electric Power Door
 - 3. Or approved equivalent by the architect.
- A. Doors shall be of steel construction, and of four-fold type as indicated on contract drawings.

2.3 MATERIALS

- A. Structural Steel: ASTM A36/A36M
- B. Steel sheets: Steel sheets of commercial quality complying with ASTM A366/A366M cold -rolled steel sheet Or A569/A569M hot rolled sheets.
- C. Steel Tubing, structural welded: ASTM A500 Grade B
- D. Hardware: Manufacturer's standard components
- E. Fasteners: Zinc coated
- F. Labeling
 - 1. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

2.4 DOOR MATERIAL AND CONSTRUCTION

- A. Stiles and rails shall be of structural steel tubing, not smaller than 4"x 3"x 3/16" with all joints welded and ground smooth. Bracing shall consist of horizontal and vertical tubular sections, to adequately stiffen the door panels.
- B. Door leaves shall be faced on the exterior side with 14-gauge sheet steel welded to stiles, rails and bracing members from the inside. There shall be no exposed welds on exterior panels. All exterior doors shall be fully insulated with fiberglass thermal insulation, full thickness of panel: door shall be covered on the inside with 14-gauge sheet steel welded to stiles, rails and bracing members. All interior welds are to be ground smooth
- C. Surface Mounted Tube Frame: Manufacturer shall supply pre-hung tube frame system, designed to anchor to structural support or masonry as provided per project documents. All hinges, track supports and operator supports shall be weld attached at the factory

D. Operating Hardware:

1. All hardware shall be heavy duty, industrial type. Hardware shall include guide track, brackets, trolleys, center guide jamb and fold hinges, bolts, nuts and all fasteners etc. Guide track shall be formed from 3/16" steel plate. Trolleys to include horizontal and vertical rollers fitted with anti friction bearings.
2. Jamb & Fold Hinges are fitted with "Timken" thrust bearings and needle roller radial bearings. The hinge pintel shall be not less than 1 1/4" diameter solid steel. All hinges are equipped with grease fittings.
3. Doors with motor-operators shall have fail-safe safety edges on the leading edges of both leading leaves.

E. Weather stripping shall be provided and installed along the bottom of each leaf and at vertical joints of leaves at centerline, to provide a substantially weather tight installation. Weather strip material shall be cloth inserted neoprene adjustable and readily replaceable.

F. Vision panels: Provide vision panels as identified in the drawings and required in the glazing specification 088000.

2.5 DOOR FINISHES

A. Factory primed by manufacturer's: sand blasted, epoxy primer and factory applied exterior grade polyurethane;

1. Color to match specified color in section 000200.

2.6 OPERATOR

A. Four-fold door shall be operated by an overhead mounted electro-mechanical drive unit, designed for heavy duty operation. Operator consists of a single electric geared brake motor, and rotating drive arm. The door shall be operated with connecting rods attached to the rotating drive arm on the operator and to control arms attached to the jamb door sections and to the door lintel. The connecting rods shall be positive drive, keeping the door under firm control at all times. The connecting rods shall be fitted with spherical bearings and control arms shall be fitted with permanently lubricated ball bearings. Operator shall open and close door with smooth acceleration and deceleration, easily and quietly without jarring under all conditions of wind pressure. Operator shall be adjustable to allow door to clear the opening. Operator shall automatically lock the door in the closed position. Operator shall be equipped with disconnect mechanism to convert to freewheeling mode for manual operation. Motor, brake, and open and close limit switches are to be factory mounted and pre-wired to a terminal block in a NEMA 12 enclosure mounted on door operator. All materials necessary for the pre-wired assembly shall conform to J.I.C. electrical standards for equipment and connections. The door contractor shall furnish and install the electric door operator including the motor, with "open-close" limit switches, hand chain disconnect switched, solenoid, brake, all pre-wired to a terminal box mounted adjacent to the motor.

B. Motor shall be 220/440 volt, 3 phases, 60 cycles, totally enclosed, ball bearing, and continuous duty and of capacity sufficient to operate the door at specified speed without exceeding a temperature rise of 55 degrees Celsius. Braking device to be operated automatically by a solenoid and be adjustable to suit the requirements of the door.

C. Comply with NFPA 70 and NEC

- D. Electric Controls: Controls shall be furnished by the door manufacturer and shall be built in accordance with the latest NEMA/NEC standards. The control panel shall bear U.L Label. (Per UL 508). Control circuits shall not exceed a nominal 110 volts
1. Controls shall include magnetic reversible starter OR variable frequency drive factory wired with overload and under voltage protection and equipped with mechanical and electrical interlocks, and with the control transformer, necessary relays, timers etc.
 2. Enclosure shall be NEMA4 with fusible disconnect. All control components shall be mounted inside the enclosure with a wiring diagram placed inside the enclosure in a pocket
 3. Push buttons for operating station shall be momentary pressure three-button station marked " OPEN, CLOSE and STOP". Push button enclosure shall be NEMA 4.
 - a. Provide two sets of push buttons: one (1) group each of push button controls for operating the three doors on each side of the apparatus bay. Total of six (6) controller stations.
 - b. Label each station to correspond with applicable door.
 4. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed positions
 5. Photo eyes NEMA 4: Door to be equipped with a minimum of one set of transmitter/ receiver style photo eyes to prevent automatic door closing when vehicle is passing.
 - a. Mount photo eyes on exterior faces of masonry door jambs, inside recessed electric junction boxes with stainless steel cover plates.
 6. Radio Control: Provide (1) radio receiver and (3) transmitters per door as required by the project.
 - a. Radio controls furnished and installed by door installer.
 7. Presence sensor NEMA 4: Provide (1) interior overhead mounted presence sensor.

2.7 REVERSING FAIL SAFE SAFETY EDGE

- A. Door manufacturer shall provide and install a rubber-encased, reverse action safety mechanism on the electrically-operated four- fold doors leading edges. The system is continuously energized and operates through the electrical system to stop the closing travel of the door on contact with an obstruction, providing an instantaneous reversal of the door travel to the fully open position. Failure of any component prevents closing of door. A multi-conductor cord from an electrical junction box on the lead door leaf is provided for the safety edge.

2.8 WIRING

- A. Door manufacturer shall supply controls only. Electrical contractor shall install controls and furnish and install all conduit and wiring.

2.9 DOOR & EQUIPMENT LABELING

- A. Identification –
1. Provide smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles.
 2. Provide labeling at each door to identify door number
 - a. Labeling at doors shall be durable painted stencil, minimum 5 inches high.
 3. Provide labeling on each control device to identify corresponding door number.
 - a. Labeling on control devices shall be 2-ply engraved acrylic plastic permanently applied to, or adjacent to control device.

PART 3 - EXECUTION

3.1 INSTALLATION

- B. Installation of the four-fold doors shall be by the manufacturer or a duly authorized agent who is qualified to do this installation. The four-fold door installer shall be responsible for mounting the door guides and hanging the door panels plumb and true with weather-stripping. The door installer will make the final adjustments of the limit switches to ensure proper operation of the doors
- C. Identification – install labeling at each door and at each control device to identify door number.
- D. Koil kords or S.O. cords: The fail -safe safety edge shall be wired with koil kords or S.O. cords. Koil kords or S.O. cords shall be furnished by door manufacturer.

3.2 ADJUSTING

- A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Any repairs that required an account of faulty materials, workmanship, design or door construction shall be made at no additional charge to the owner.

3.3 DEMONSTRATION

- A. Startup services: Engage a factory-authorized service representative to perform startup services and to train owner's maintenance personnel as specified below:
 - 1. Train owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and procedures for testing and resetting release devices.
 - 2. Review data in the maintenance manuals. Refer to division 1 Section "Contract Closeout"
 - 3. Schedule training with owner with at least 7 days advance notice.

END OF SECTION 083500

SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes electrically operated sectional doors.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.
 - 2. Div 26 - Electrical service and connections for powered operators .

1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door, accessory and motor operator.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Samples: For each exposed product and for each color and texture specified
 - 1. Selection Samples: Furnish color samples or 2' X 2' section sample.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sectional doors and operators that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

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- B. Special Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 - 1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward.
 - 2. Testing: According to ASTM E 330 or DASMA 108 for garage doors and complying with the acceptance criteria of DASMA 108.

2.2 DOOR ASSEMBLY

- A. Steel Sectional Door: Sectional door formed with hinged sections and fabricated according to DASMA 102 unless otherwise indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Clopay Building Products Model 3720, Flush steel, glazed, thermally-broken, polyurethane insulated overhead door, or comparable product from one of the following:
 - a. C.H.I. Overhead Doors
 - b. Haas Door
 - c. Overhead Door Corp.
 - d. Raynor
 - e. Wayne-Dalton Corporation
 - 2. Door Construction
 - a. Panels: Foamed in place Polyurethane core construction between exterior and interior steel skins.
 - b. Steel Skins: Formed from roll formed commercial or drawing quality steel sheet, hot-dip galvanized per ASTM A 924/A 924M and ASTM A 653/A 653M, pre-painted with primer and baked-on polyester topcoat; sections formed to create weather tight tongue-in-groove meeting joint.
 - c. Reinforcing: Galvanized and primed steel reinforcement located under each hinge location, pre-punched for hinge attachment.
- B. Premium Duty 2-inches (51 mm) Door: Clopay Model 3720.
 - 1. Style: Flush steel doors, thermally-broken, polyurethane insulated.
 - 2. Maximum Door Size: 32 feet, 2 inches (9.8 m) wide by 26 feet (7.9 m) high.

3. Overall Panel Thickness: 2-inches (51 mm).
 4. Steel Skin Thickness: Minimum 20 gauge 0.034 inch (0.86 mm) exterior; minimum 27 gauge 0.016 inch (0.40 mm) interior.
 5. End Stiles: Galvanized steel end stiles, engineered for easy hardware attachment through pre-punched holes. Minimum 18 gauge, 0.045 inch (1.14 mm) thick for single end hinge style and 16 gauge .056 inch (1.42 mm) minimum for double end hinge style.
 6. Astragal: U-shaped flexible PVC in retainer of full-length 0.055 inch (1.4 mm) rigid PVC.
 7. Thermal Resistance (R-value): 18.4 deg F hr sq ft/Btu (3.0 (K sq m)/W); calculated door section R-value in accordance with DASMA TDS-163.
 8. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated
 9. U-Factor: 0.16
 10. Air Infiltration: .022 cfm @ 25 mph
 11. Windows: Full vision aluminum section, pre-painted to match door finish.
 - a. Glazing: 7/8 inch (22mm) dual pane tempered insulated glazing.
 - b. Location: Section 3
- C. Operation Cycles: Door components and operators capable of operating for not less than 100,000 cycles.
- D. Steel Sections: Zinc-coated (galvanized) steel sheet with G90 (Z275) zinc coating.
- E. Finish:
1. Exterior Facing Material: Flush Stucco embossed texture,
 - a. Exterior Color: As scheduled in section 000200 Material Finish / Color Schedule.
 2. Interior Facing Material: Flush Stucco embossed texture,
 - a. Interior Color: As scheduled in section 000200 Material Finish / Color Schedule.
- E. Door Drop Safety Device: Provide brackets designed to stop the fall of the door should lift cables fail.
- F. Weatherstripping: Provide complete perimeter seals. Provide flexible top seal, flexible jamb seal and U shaped bottom seal.
1. Provide combination bottom weatherseal and sensor edge.
- G. Track Configuration: Standard configuration - field verify conditions for track configuration selection. Coordinate selection with Architect and Owner.
- H. Track Size: 3 inches (75 mm) track for 3 inch diameter rollers.
1. Vertical and horizontal tracks minimum 0.096 inch (2.43 mm) galvanized steel.
 2. Provide track configuration to maximize headroom available per plans.
- I. Spring Counterbalance: Torsion spring counterbalance mechanism sized to weight of the door, with with high strength galvanized aircraft cable with minimum 7 to 1 safety factor.
- a. High Cycle Spring: 100,000 cycles.
- J. Locking Devices: Equip door with one inside slide lock with interlock assembly.
- ## 2.3 ELECTRIC DOOR OPERATORS
- A. Operators
1. Extreme Series Motor Operation

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- a. Manufacturer: LiftMaster
- b. Motor design: 1.25 HP
 - 1) 3-phase, 460/575V available with supplementary step-down transformer provided by manufacturer.
2. Operation: Variable speed direct drive
 1. Operator Speed: Travels an average of 24" in the up direction and between 12"-18" in the down direction, depending on door type and drum size. Includes soft start/stop ramps.
4. Motor: Listed by Underwriters Laboratories. Meet UL 325
5. Wall controller: Provide separation of low and high voltage wiring and include functionality of 3-button station; set door profile and programming limits, and performs diagnostics
 - a. Floor-level programming: Set limits, door profile, operating modes, and select photo entrapment devices via wall controller from standing height
 - b. Display: Absolute cycle count, service cycle count, diagnostic messages, and door and operator status via 2 line, text LED display
 - c. Cycle counter: Resettable via wall controller or myQ technology
 - d. Limit setting: Electronic pushbutton via wall controller
 - e. Service cycle count, lifetime cycle count, and remote diagnostics via wall controller or myQ technology
6. Manual Hoist: Manual hoist with integral manual operation protection circuit
7. Cable Tension Monitor: Mitigates door operation when cable slackening occurs
8. Internet connectivity:
 - a. Built-in Wi-Fi with myQ technology
 - b. Over-the-air updates
9. Primary monitored entrapment protection:
 - a. Light Curtain UL 325 approved (standard)
10. Obstruction Detection Device: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
 - a. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction
 - b. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
11. Emergency Manual Operation: Equip electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

12. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 - a. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- B. Electric Controls: Controls shall be furnished by the door manufacturer and shall be built in accordance with the latest NEMA/NEC standards. The control panel shall bear U.L Label. (Per UL 508). Control circuits shall not exceed a nominal 110 volts
 1. Controls shall include magnetic reversible starter OR variable frequency drive factory wired with overload and under voltage protection and equipped with mechanical and electrical interlocks, and with the control transformer, necessary relays, timers etc.
 2. Enclosure shall be NEMA4 with fusible disconnect. All control components shall be mounted inside the enclosure with a wiring diagram placed inside the enclosure in a pocket
 3. Push buttons for operating station shall be momentary pressure three-button station marked " OPEN, CLOSE and STOP". Push button enclosure shall be NEMA 4.
 - a. Provide two sets of push buttons: one (1) group each of push button controls for operating the three doors on each side of the apparatus bay. Total of six (6) controller stations.
 - b. Label each station to correspond with applicable door.
 4. Limit switches shall be provided to stop the travel of the door in its fully open or fully closed positions
 5. Photo eyes NEMA 4: Door to be equipped with a minimum of one set of transmitter/ receiver style photo eyes to prevent automatic door closing when vehicle is passing.
 - a. Mount photo eyes on exterior faces of masonry door jambs, inside recessed electric junction boxes with stainless steel cover plates.
 6. Radio Control: Provide (1) radio receiver and (3) transmitters per door as required by the project.
 - a. Radio controls furnished and installed by door installer.
 7. Presence sensor NEMA 4: Provide (1) interior overhead mounted presence sensor.
 8. Provide external antenna and coaxial wiring to receiver to enhance radio control reception.
- Q. Provide auxiliary chain hoist: for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

2.3 STEEL DOOR SECTIONS

- A. Exterior Section Faces and Frames: Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet.
 1. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weather-resistant seal, with a reinforcing flange return.
 2. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
- B. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet welded to door section. Provide intermediate stiles formed from galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.

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- C. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal.
- D. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.
- E. Provide reinforcement for hardware attachment.
- F. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections and the interior facing material, with no exposed insulation.

2.4 TRACKS, SUPPORTS, AND ACCESSORIES

- A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances indicated on Drawings. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides for required door type, size, weight, and loading.
 - 1. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device.
- B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.
- C. Windows: Manufacturer's standard window units of type, size, and in arrangement indicated. Provide removable stops of same material as door-section frames.

2.5 HARDWARE

- A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
- B. Hinges: Heavy-duty, galvanized-steel hinges at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails.
- C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.
- D. Push/Pull Handles: Equip each push-up operated or emergency-operated door with galvanized-steel lifting handles on each side of door, finished to match door.

2.6 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: Cylinders specified in Sections 087100 "Door Hardware and 087161 "Door Hardware Schedule, keyed to building keying system.
 - 2. Keys: Three for each cylinder.
- C. Chain Lock Keeper: Suitable for padlock.
- D. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.7 COUNTERBALANCE MECHANISM

- A. Specialized torsion spring counterbalance mechanism sized to weight of the door. Spring to be helically wound, oil tempered, treated with secondary process to increase cycle life and reliability. Spring to be mounted on a solid steel shaft with center coupling
- B. Cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 7 to 1 safety factor. Cable to be at minimum 7-19 stranded 3/16 diameter with thimble loop.
- C. Cable Safety Device: Snubbers to help maintain cable tension.
- D. Spring cycles:
 - 1. Max Cycles
- E. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
- F. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

2.8 DOOR & EQUIPMENT LABELING

- A. Identification –
 - 1. Provide smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles.
 - 2. Provide labeling at each door to identify door number
 - a. Labeling at doors shall be durable painted stencil, minimum 5 inches high.
 - 3. Provide labeling on each control device to identify corresponding door number.
 - a. Labeling on control devices shall be 2-ply engraved acrylic plastic permanently applied to, or adjacent to control device.

PART 3 EXECUTION

A. INSTALLATION

1. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
 - a. Tracks: Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
 - b. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
 - c. Power-Operated Doors: Install automatic garage doors openers according to UL 325.
 - d. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 - e. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780/A 780M.
 - f. Identification – install labeling at each door and at each control device to identify door number.

B. DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 083613

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storefront framing.
 - 2. Manual-swing entrance doors.

1.1 SINGLE MANUFACTURE

- A. Single Manufacture: All products in divisions listed below shall be supplied by a single manufacturer. To ensure consistency in quality, warranty, finish, and product compatibility, products supplied by different manufacturers are not acceptable.
 - 1. Division 8 - Section 084113 - Aluminum-Framed Entrances and Storefronts.
 - 2. Division 8 - Section 085113 – Aluminum Windows.

1.2 RELATED SECTIONS

- A. Division 8 - Section 085113 – Aluminum Windows
- B. Division 8 - Section 088000 Glazing

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples: For each type of exposed finish required.
- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

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- E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
- B. Product test reports.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 WARRANTY

- A. Special Warranty: Manufacturer and installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to $3/4$ inch (19.1 mm), whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or $1/8$ inch (3.2 mm), whichever is smaller.
 - 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than $1/240$ of clear span plus $1/4$ inch (6.35 mm) for spans greater than 11 feet 8- $1/4$ inches (3.6 m) or $1/175$ times span, for spans less than 11 feet 8- $1/4$ inches (3.6 m).
- E. Structural: Test according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).
 2. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- H. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 35 as determined according to NFRC 500.
- I. Thermal Movements: Allow for thermal movements resulting 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 STOREFRONT SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Tubelite "T24650 Series, 2" x 6 1/2" storefront thermal framing system or approved equal by one of the following:
1. Arch Aluminum & Glass Co., Inc.
 2. EFCO Corporation.
 3. Kawneer
 4. United States Aluminum.
 5. YKK AP America Inc.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: Thermally broken.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Exterior Glazing Plane: Front glazed.
 4. Finish: Clear anodic finish.
 5. Fabrication Method: Field-fabricated stick system.
 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
- E. Sill Receptor Flashing: Manufacturer's, extruded aluminum, high performance thermally broken, extruded aluminum sill receptor flashing to allow system to internally drain. Provide Kawneer T24659.
- F. Operable Windows: Refer to Specification Section 085113 for Aluminum Windows.

2.3 ENTRANCE DOOR SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Tubelite "Thermal Block, Wide Stile, Entrance Door" or a comparable product from one of the following:
 1. Arch Aluminum & Glass Co., Inc.
 2. EFCO Corporation.
 3. Kawneer
 4. United States Aluminum.
 5. YKK AP America Inc.
- B. Entrance Doors: Manufacturer's heavy duty, glazed entrance doors for manual-swing operation.
 1. Door Construction: 2-1/4-inch (57.2-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
 2. Door Design: Medium stile; 5-inch vertical stiles and top rail, 10 inch bottom rail.
 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.4 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."

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- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

2.6 MATERIALS

- A. Sheet and Plate: ASTM B209 (ASTM B209M).
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
- C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
- D. Structural Profiles: ASTM B308/B308M.
- E. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
 - 4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M10C21A41, Class I, 0.018 mm or thicker.
 - 1. Color: Refer to 'Material Finish / Color Schedule Section 000200'.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

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2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084113

SECTION 084115 - FIBERGLASS REINFORCED POLYESTER (FRP) DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced polyester (FRP) flush doors.

1.02 RELATED SECTIONS

- A. Section 079200 - Joint Sealants: Perimeter sealant and back-up materials.
- B. Section 084113 – Aluminum Framed Entrances and Storefronts
- D. Section 087100 - Door Hardware: Hardware items other than those specified in this section.

1.03 SYSTEM PERFORMANCE – FRP FLUSH DOORS

- A. Provide door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
- B. Thermal Transmission (exterior doors); U-value of not more than 0.09 (BTU/Hr. x sf x degrees F.) per AAMA 1503.01.
- C. Flame Spread/Smoke Developed: Provide FRP doors and panels with the following ratings in accordance with ASTM E 84-79a: Flame Spread: Exterior faces not greater than 145 (Class C); interior faces not greater than 10 (Class A). Smoke Developed: Exterior faces not greater than 345 (Class C); interior faces not greater than 320 (Class A).
- D. Additional Criteria: Provide FRP doors and panels with the following performance:
ASTM D 256 - nominal value of 13.5
ASTM D 1242 - nominal value of .23 percent
ASTM D 570 - nominal value of .20 to .40 percent
ASTM D 2583 - nominal value of 50

1.04 SYSTEM DESCRIPTION – ALUMINUM STOREFRONT FRAMING SYSTEMS

- A. Performance Requirements: Refer to section 084113 for requirements.

1.05 QUALITY ASSURANCE

- A. Standards: Comply with the requirements and recommendations in applicable specification and standards by NAAMM and AAMA, including the terminology definitions and specifically including the "Entrance Manual" by NAAMM, except to the extent more stringent requirements are indicated.
- B. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than five (5) years successful experience in the installation of systems similar to those required.

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- C. Field Measurement: Field verify all information prior to fabrication and furnish all materials to suit.
- D. Regulation and Codes: Comply with the current edition in force at the project location of all local, state and federal codes and regulations, including the current Americans with Disabilities Act.

1.06 SUBMITTALS

- A. Product Data: Submit Manufacturer's product data, specifications and instructions for each type of door.
 - 1. Include details of core, stile and rail construction, trim for lites and all other components.
 - 2. Include details of door hardware mounting.
- B. Submit shop drawings for the fabrication and installation of the doors and frames, and associated components. Details to be shown full scale. Include glazing details and door hardware schedule.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to jobsite in their original, unopened packages with labels intact. Inspect materials for damage and advise manufacturer immediately of any unsatisfactory materials.
- B. Package door assemblies in individual cartons protected so no portion of the door has contact with the outer shell of the container.

1.08 PROJECT WARRANTY

- A. Provide a written warranty signed by manufacturer, installer and contractor, agreeing to replace, at no cost to the Owner, any doors, frames or factory hardware installation which fail in materials or workmanship, within the warranty period. Failure of materials or workmanship includes: excessive deflection, faulty operation of entrances, deterioration of finish, or construction in excess of normal weathering and defects in hardware installation.
 - 1. Fiber Reinforced Plastic (FRP) door warranty period – ten (10) years.
 - 2. Aluminum Storefront, refer to Section 084113.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Fiber Reinforced Polyester Door Manufacturer: Subject to compliance with requirements, provide Special-Lite, Inc. "Flush Door SL-17" or equal product by the following:
 - 1. Cline Aluminum Doors, Inc.
 - 2. Curries
 - 3. Oshkosh Door Company.
 - 4. Vale Doors.

2.02 MATERIALS AND ACCESSORIES

- A. Fasteners: Aluminum non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened, without exposed fasteners.
- B. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- C. Sliding Weatherstripping: Provide the manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

2.03 FABRICATION

- A. Sizes and Profiles: The required sizes for door and frame units, and profile requirements are shown on the drawings.
- B. Coordination of Fabrication: Field measure before fabrication, and show recorded measurements on final shop drawings.
- C. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to assembly. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".
- D. No welding of doors or frames is acceptable.
- E. Maintain continuity of line and accurate relation of planes and angles. Secure attachments and support at mechanical joints, with hairline fit at contacting members.
- E. Attachment of all hardware shall be made using machine screws which are supplied by the manufacturer.
- F. All holes shall be drilled and tapped using the recommended drill size for the tap required.
- G. Door attachment points shall be minimum of 1/8" thickness.
- H. Where hardware is to be attached to frame stop (Example: exit device strike, door closer shoe, O.H. stop & etc.) a piece of solid bar stock aluminum sized to fill the frame stop void x 18" long shall be securely attached to the frame tube.

2.04 FIBERGLASS REINFORCED POLYESTER (FRP) FLUSH DOORS

- A. Materials and Construction
 - 1. Construct 1-3/4" thickness doors of 6063-T5 aluminum alloy stiles and rails - minimum 6" width top, 5" width lock side and 3" bottom and hinge rail . Provide full width mortise and tendon joints, tie rods through extruded splines top and bottom not approved. 125" tubular shaped stiles and rails reinforced to accept hardware as specified. Furnish integral reglets to accept face sheet to permit a flush appearance.
 - 2. Extrude top and bottom rail legs for interlocking continuous rail rigidity weather bar and

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reinforcement for door hardware. Lock face sheet material in place with extruded interlocking edges to be flush with aluminum stiles and rails.

3. Door face sheeting .120" thickness fiberglass reinforced polyester. With pebble-like embossed pattern.
4. Core of Door Assembly: Poured in place polyurethane foam (slip in core will not be accepted), minimum five pounds per cubic foot density, with a minimum "R" value of 11. Meeting stiles on pairs of doors, and weather bars with nylon brush weather stripping.
6. Pre-machine doors in accordance with templates from the specified door hardware manufacturers and approved hardware schedule.
7. Provide stabilizing 3 ½" minimum tubular mid-rail at all doors.
8. Provide internal steel reinforcement for specified hardware configurations.
9. Finish: Exposed stiles, rails, trim or trim caps to be 304 stainless steel.
10. Provide Markar HG305 hinge 32D with left hand adjusta-screw for all doors.

B. FRP FINISHES

1. Color: Refer to Material Finish / Color Schedule Section 000200.

C. ALUMINUM FINISHES

1. Anodized: Refer to Section 084113.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's recommendations and specifications for the installation of the doors and frames. Factory install hardware on the doors.
- B. Set units plumb, level and true to line, without warp or rack of doors or frames. Anchor securely in place. Separate aluminum and other metal surfaces with bituminous coatings or other means as approved by architect.
- C. Set thresholds in a bed of mastic and backseal.
- D. Clean surfaces promptly after installation of doors and frames, exercising care to avoid damage to the protective coatings.
- E. Ensure that the doors and frames will be without damage or deterioration.
- F. Provide Owner with all adjustment tools and instruction sheets. Arrange an in-service session to Owner at Owner's convenience. Any workmanship that is defective or deficient shall be corrected to the Owner's satisfaction and at no additional cost to the Owner.

END OF SECTION 084115

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes aluminum windows and all components and installation accessories supplied with the system.

1.2 SINGLE MANUFACTURE

- A. Single Manufacture: All products in divisions listed below shall be supplied by a single manufacturer. To ensure consistency in quality, warranty, finish, and product compatibility, products supplied by different manufacturers are not acceptable.
 - 1. Division 8 - Section 084113 - Aluminum-Framed Entrances and Storefronts.
 - 2. Division 8 - Section 085113 – Aluminum Windows.

1.3 RELATED SECTIONS

- A. Division 8 - Section 084113 - Aluminum-Framed Entrances and Storefronts
- B. Division 8 - Section 088000 Glazing

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
 - 1. Show connection to and continuity with adjacent Aluminum-Framed Storefront systems.
- C. Samples: For each exposed product and for each color specified.
- D. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
- B. Product test reports.
- C. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

Warranty Period:

- a. Window: 10 years from date of Substantial Completion.
- b. Aluminum Finish: 10 years from date of Substantial Completion.
- c. Glazing Units: Refer to Section 088000.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AAMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 1. Minimum Performance Class: Awning: Class AW
 1. Minimum Performance Grade: 80
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.37 Btu/sq. ft. x h x deg F (1.71 W/sq. m x K).
- E. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40 or as applicable to geographical region products are installed
- G. Condensation Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, applicable to geographical region products are installed.
- H. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change: 120 deg F (67 deg C) ambient; 180 deg F (100 deg C) material surfaces.

2.2 ALUMINUM WINDOWS

- A. Basis of Design: Subject to compliance herein, provide "UniVent 1375AW Series" Aluminum Windows as manufactured by Tubelite Inc. or comparable product by one of the following:
 1. Arch Aluminum & Glass Co., Inc.
 2. EFCO Corporation.
 3. Kawneer
 4. United States Aluminum.
 5. YKK AP America Inc.
- B. Types: Awning.
- C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- D. Glass: Refer to Section 088000, Glazing.
 1. Kind: Insulating-Glass Units
- F. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

- G. Hardware, General: Provide manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 ACCESSORIES

- A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.
- B. Column Covers: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- C. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- D. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- E. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.4 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: Full, inside for projected, awning sashes.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
- C. Glass-Fiber Mesh Fabric: 18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm) mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
 - 1. Mesh Color: Manufacturer's standard.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.

- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Color Anodic Finish: AAMA 611, AA-M10C21A41, Class I, 0.018 mm or thicker.
 - 1. Color: Refer to 'Material Finish / Color Schedule Section 000200'.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- E. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

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END OF SECTION 085113

SECTION 085653 BALLISTIC RATED TRANSACTION WINDOW

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Ballistic rated aluminum transaction window.

1.2 REFERENCES

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment.
- B. ASTM E119-98- Standard Test Methods for Fire Tests of Building Construction and Materials.
- C. ASTM B 209/B 209M- Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- D. ASTM A 666-Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

1.3 SUBMITTALS

- A. Product Data: For each type of framing and glass including manufacturer recommended installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, attachment to other work.
- C. Samples: For each exposed finish.

1.4 INFORMATION SUBMITTALS

- A. Product Test Reports: Indicating compliance with requirements
- B. Warranty: Sample of finish warranty

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect windows and accessories in accordance with AAMA CW-10 "Care and Handling of Architectural Aluminum from Shop to Site" until Substantial Completion.
- B. Deliver materials to the project site with the manufacturer's UL Listed Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations provided by manufacturer. Do not install products stored in conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Workmanship Warranty: All materials shall be warranted against defects for a period of 1 year for the date of receipt at the project site. Provide certificates of manufacturer's standard limited warranty with closeout documents.
- B. Finish Warranty: Manufacturer's warranty against deterioration of factory finishes for the period of 5 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Basis of Design:
 - 1. Subject to compliance with requirements, provide TSS Natural Voice Rail (NVR), bullet resistant aluminum transaction window by the following:
 - a. Total Security Solutions, Inc., 935 Garden Lane, Fowlerville, MI 48836, 866 734-6277. Attn: Sales Department, sales@tssbulletproof.com. Web: www.tssbulletproof.com.
- B. Design Performance:
 - 1. Through the design, manufacturing techniques and material application, the bullet resistant transaction window shall be of the non-ricochet type. This design is intended to permit the capture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.
 - 2. The assembly shall employ a spacer within the frame to allow for natural sound transmission.
 - 3. Transaction position shall have a stainless-steel dip tray as shown on the drawings.
 - 4. All vision panels shall be cut to size with all exposed edges polished
 - 5. Stainless steel assembly screws and acrylic spacers shall be included.
- C. Provide anchor screws as required to install equipment.
- D. Field alterations to the construction of the assembly fabricated under the acceptable standards are not allowed unless approved in writing by the manufacturer and the Architect.
- E. Standard manufacturing tolerances +/- 1/16" shall be maintained.
- F. Materials shall meet or exceed UL 752 requirements.

2.2 BULLET RESISTANT NATURAL VOICE RAILS TRANSACTION WINDOW

- A. Ballistic Resistant: Level 3 in accordance with UL 752 – Testing for Ballistic Resistance for the complete assembly including framing, glazing and panels.

2.3 FABRICATION

- A. Aluminum sections to be manufactured in accordance with ASTM B209, Extruded aluminum alloy 6063 T5 Anodized to match the existing décor and be free of sharp edges or burrs when in place.
- B. Glazing Channel: U-Channel specifically designed for securing transparencies tightly in place. Angles and stops are only acceptable for top attachment. All exposed aluminum edges shall be clean cut and have no burrs. Exposed corners shall be rounded and sanded.
- C. Ballistic fiberglass rated UL Level 3 shall be secured within the frames.
- D. Tolerances: All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members

2.4 FRAMING FINISH

- A. Factory-applied finish:
 - 1. Clear Anodic Finish: Architectural Class I, clear coating AA-M10C22A41 Mechanical Finish Chemical Finish: etched, medium matte; 0.70 mils minimum complying with AAMA 611 "Voluntary Specification for Anodized Architectural Aluminum"

2.5 GLAZING

- A. Glazing shall be as shown on the drawings and as specified herein.
 - 1. Bullet Resistant Level 3
 - a. 1 1/4" LP 1250 Laminated
 - b. 1 1/4" All Poly 1250
 - c. 1 1/4" TSS-003 L/S Glass Clad
- B. Acrylic: All acrylic pieces shall meet or exceed UL 752 testing for ballistic integrity. All edges of acrylic shall be filed, sanded after cutting to remove rough edges and then polished until "water clear" transparent. All through holes for fasteners shall be 3/8" in diameter and be drilled clean. Chipped edges at through-hole exit points are not acceptable. All acrylic pieces shall be supported in the proper glazing channel designed for this purpose.
- C. Glazing gaskets:
 - 1. Interior: Closed cell neoprene.
 - 2. Exterior: Solid neoprene.

2.6 ACCESSORIES

- A. Anchors: Fully concealed manufacturer recommended.

- B. Mounting plates and connecting clips shall be fabricated from 1/8" thick clear polycarbonate.
- C. Countertop: Refer to Section 123661.16 Solid Surfacing for countertop requirements.
 - 1. Provide and install a recessed cash tray.

2.7 FRAME

- A. Frame to be anodized aluminum.
- B. The bottom of the glazing shall be capped with corresponding material on the frame
- C. Product size shall be as indicated on drawings, but recommended width not to exceed 60" and height not exceeding 60".

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings.
- B. Install in accordance with manufacturer's instructions and UL 752. Set all equipment plumb.
- C. All products shall be installed per installation instructions provided by manufacturer.
- D. Security window units shall arrive on site completely pre-fabricated to field dimensions approved by Shop Drawings.
- E. Install framing and secure to structure in accordance with manufacturer's recommendations and approved shop drawings.
- F. Provide required support and securely fasten and set windows plumb, square, and level without twist or bow.
- G. Apply sealant in accordance with window and sealant manufacturer's recommendations as indicated in installation instructions.
- H. Remove excess sealant and leave exposed surfaces clean and smooth

3.2 PROTECTION

- A. Clean and protect windows from damage during ongoing construction operations. If damage occurs, remove and replace as required to provide windows in their original, undamaged condition.
- B. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements.
- C. Provide final cleaning of product and accessories, removing excess sealant, labels and protective covers.

D. Touch-up, repair or replace damaged products prior to Substantial Completion.

END OF SECTION 085653

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames".
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Bullet Resistant Wood Door and Frame Assembly".
4. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
5. Division 28 Section "Access Control".

- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. Michigan Building Code 2015, Local Amendments.

- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door

numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

- E. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.

- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

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2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. Hager Companies (HA) - BB Series, 5 knuckle.
 - b. McKinney (MK) - TA/T4A Series, 5 knuckle.
 - c. dormakaba Best (ST) - F/FBB Series, 5 knuckle.
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
 - a. Hager Companies (HA).
 - b. Pemko (PE).
 - c. Dormakaba Best (ST).
- C. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Manufacturers:
 - a. Hager Companies (HA).
 - b. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
 - c. Pemko (PE).
 - d. Dormakaba Best (ST).

2.3 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified

in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
 - a. Hager Companies (HA) - ETW-QC (# wires) Option.
 - b. McKinney (MK) - QC (# wires) Option.

B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
 - a. Securitron (SU) - EL-CEPT Series.

C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney (MK) - Connector Hand Tool: QC-R003.
2. Manufacturers:
 - a. McKinney (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).

- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Manufacturer's Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
 2. Manufacturers:
 - a. Corbin Russwin (RU) - Access 3 AP.
 - b. Sargent (SA) - Degree DG1.
- E. Keying System: Each type of lock and cylinders to be factory keyed.

1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide temporary keyed construction cores.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.6 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

- a. Lund Equipment (LU).
- b. MMF Industries (MM).
- c. Telkee (TK).

P. Electronic Key Management System: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. Minimum 1,000 system users and 21 iFobs for locking receptors. System shall have a minimum 250,000 audit events screen displayed or ability to be exported via USB port.

1. Manufacturers:

- a. Medeco (MC).
- b. Traka (TA).

2.7 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

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1. Where specified, provide status indicators with highly reflective color and wording for "locked/unlocked" or "vacant/occupied" with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1" x 0.6" with a curved design allowing a 180-degree viewing angle with protective covering to prevent tampering.
 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 Series.
- B. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.
1. Locks shall meet or exceed the requirements of ANSI/BHMA A156.2 Series 4000, Grade 1 with all standard trims, as follows:
 - a. Cycle Test: ANSI/BHMA A156.2 Grade 1 requirements with no lever sag.
 - b. Abusive Locked Lever Torque: Exceed 3,100 in-lb with no entry; lock to maintain egress functionality in compliance with BHMA certification requirements.
 - c. Offset Lever Pull: Exceed 1,600 lbs with no entry (8 times ANSI/BHMA A156.2 requirements).
 - d. Latch Retraction with Preload: Exceed 100 lb preload while maintaining ANSI/BHMA requirements for operation in warped doors (2 times ANSI/BHMA A156.2 requirements).
 2. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
 3. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
 4. Locks are to be non-handed and fully field reversible.
 5. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - CLX3300 Series.
 - b. Sargent Manufacturing (SA) - 10X Line.
 - c. Schlage (SC) - ND Series.

2.8 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed, subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below and in the hardware sets.
1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 2. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.

3. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML20900 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Schlage (SC) - L9000 EL/EU/RX Series.

2.9 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 5. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

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1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. dormakaba Best (PR) - Apex 2000 Series.

2.10 ELECTROMECHANICAL EXIT DEVICES

A. Electromechanical Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices subject to same compliance standards and requirements as mechanical exit devices. Electrified exit devices to be of type and design as specified below and in the hardware sets.

1. Energy Efficient Design: Provide devices which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
2. Where conventional power supplies are not sufficient, include any specific controllers required to provide the proper inrush current.
3. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
4. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED5000 Series.
 - b. dormakaba Precision (PR) - Apex 2000 Series.
 - c. Sargent Manufacturing (SA) - 80 Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - DC8000 Series.
- b. LCN Closers (LC) - 4040XP Series.
- c. Norton Rixson (NO) - 9500 Series.

C. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard..

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - DC6000 Series.
- b. LCN Closers (LC) - 4040 Series.
- c. Norton Rixson (NO) - 7500 Series.

2.12 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Rockwood (RO).
- c. Trimco (TC).

2.13 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.15 ELECTRONIC ACCESSORIES

- A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.
 - 1. Manufacturers:
 - a. Alarm Controls (AK) - SREX Series.
 - b. Securitron (SU) - XMS Series.
- B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Securitron (SU) - DPS Series.
- C. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
 - 1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - 2. Manufacturers:
 - a. Securitron (SU) - AQL Series.

2.16 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.


- B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. MR - Markar
4. RO - Rockwood
5. RU - Corbin Russwin
6. AD - Adams Rite
7. RF - Rixson
8. OT - Other
9. SU - Securitron

Hardware Sets

Set: 1.0

Doors: 151A

1	Continuous Hinge	CFM-SLF-HD1 x PT		PE	
1	Fail Secure Lock	ML20906-SEC NSA M92 ACP GMK	626	RU	
1	Surface Closer	DC8210 A4 M85 M77/M78	689	RU	
1	Threshold	252x3AFG Pemkote MSES25SS		PE	
1	Weatherstrip	- integral within construction of door and frame assembly		00	

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1 Sweep	29326CNB TKSP8		PE	
1 ElectroLynx Harness	QC-C (power transfer to lock location)		MK	⚡
1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	
1 Electric Power Transfer	EL-CEPT	630	SU	⚡

Notes: Door normally closed and locked. Key override outside retracts latchbolt. Valid use of card reader outside temporarily unlocks outside lever for access. Inside lever function equipped with signal switch for request to exit alarm shunt (REX). Free egress always permitted.

Set: 2.0

Doors: 159

1 Continuous Hinge	CFM-SLF-HD1 x PT		PE	
1 Electrified Rim Exit, Fail Secure	ED5200S N9905ET M110 M92 M52	630	RU	⚡
1 Mort. Cylinder	CR1580 GMK	626	RU	
1 Rim Cylinder	CR3580 GMK	626	RU	
1 Surface Closer	DC8210 A4 M85 M77/M78	689	RU	
1 Threshold	252x3AFG Pemkote MSES25SS		PE	
1 Weatherstrip	- integral within construction of door and frame assembly		00	
1 Sweep	29326CNB TKSP8		PE	
1 ElectroLynx Harness	QC-C (power transfer to exit device lever trim)		MK	⚡
1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK	⚡
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	

Notes: Door normally closed and locked. Valid use of card reader temporarily unlocks lever trim for access. Push rail equipped with built-in signal switch to be wired for request to exit. Free egress always permitted.

Set: 3.0

Doors: 122

1 Continuous Hinge	CFM-SLF-HD1 x PT		PE	
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1 Paddle Operator	4591 ("PUSH")	US26D	AD	
1 Electrified Deadlatch	4300-M ELX	628	AD	⚡
1 Mort. Cylinder	CR1580 GMK	626	RU	
1 Pull	RM201 Mtg-Type 12XHD	US32D-316	RO	
1 Push Pull	RM251 Mtg-Type 12XHD Mtg-Type 11XHD	US32D-316	RO	
1 Surface Closer	DC8210 A5 M85 M77/M78 (H.O.)	689	RU	
1 Threshold	252x3AFG Pemkote MSES25SS		PE	
1 Weatherstrip	- integral within construction of door and frame assembly		00	
1 Sweep	29326CNB TKSP8		PE	
1 ElectroLynx Harness	QC-C (power transfer to lock location)		MK	⚡
1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 Motion Sensor	XMS		SU	⚡
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	

Notes: Door normally closed and locked. Fail secure lockset - Valid use of card reader exterior side of door temporarily unlocks deadlatch to allow passage through door by pulling door.
Key override outside retracts latch bolt.
Motion sensor inside shunts door monitoring upon egress.
Free egress always permitted.

Set: 4.0

Doors: 105A

1 Continuous Hinge	CFM-SLF-HD1 x PT		PE	
1 Rim Exit Device, Nightlatch	ED4200S K157ET M110 MELR M52	630	RU	⚡
1 Mort. Cylinder	CR1580 GMK	626	RU	
1 Rim Cylinder	CR3580 GMK	626	RU	
1 Pull	RM201 Mtg-Type 12XHD	US32D-316	RO	
1 Surface Closer	DC8210 A4 M85 M77/M78	689	RU	
1 Drop Plate	754F25 (if required)	689	RU	
1 Threshold	252x3AFG Pemkote MSES25SS		PE	
1 Weatherstrip	- integral within construction of door and frame assembly		00	
1 Sweep	29326CNB TKSP8		PE	

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1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK	⚡
1 Intercom / Video Station	- Provided by Security Contractor		OT	
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	
1 Electric Power Transfer	EL-CEPT	630	SU	⚡

Notes: Operation Description: Door normally closed and locked. Key override outside retracts latch bolt. Valid use of card reader outside or activation of remote push button in intercom system retracts latch bolt of exit device. Keyed cylinder inside controls dogging of latch bolt for push / pull operation. Exit device equipped with electric latch retraction and REX signal switch in push rail for shunting of door monitoring upon egress. Free egress always permitted.

Set: 5.0

Doors: 150

2 Continuous Hinge	CFM-SLF-HD1			PE
2 Flush Bolt	555	US26D		RO
1 Storeroom Lock	ML2057 NSA ACP GMK	626		RU
1 Surf Overhead Hold Open	9-X26	652		RF
1 Surface Closer	DC8210 A5 M85 M77/M78 (H.O.)	689		RU
1 Threshold	252x3AFG Pemkote MSES25SS			PE
1 Weatherstrip	- integral within construction of door and frame assembly			00
2 Sweep	29326CNB TKSP8			PE

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 6.0

Doors: 160A

1 Continuous Hinge	CFM-SLF-HD1			PE
1 Storeroom Lock	ML2057 NSA ACP GMK	626		RU
1 Wall Stop	406	US32D		RO
1 Threshold	252x3AFG Pemkote MSES25SS			PE
1 Weatherstrip	- integral within construction of door and frame assembly			00
1 Sweep	29326CNB TKSP8			PE

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Set: 7.0

Doors: 202, 203B

1 Continuous Hinge	CFM-SLF-HD1		PE
1 Storeroom Lock	ML2057 NSA ACP GMK	626	RU
1 Surface Closer	DC8210 A5 M85 M77/M78 (H.O.)	689	RU
1 Threshold	252x3AFG Pemkote MSES25SS		PE
1 Weatherstrip	- integral within construction of door and frame assembly		00
1 Sweep	29326CNB TKSP8		PE
1 Position Switch	DPS-M/W-BK		SU ⚡

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 8.0

Doors: 123

1 Continuous Hinge	CFM-SLF-HD1		PE
1 Rim Exit Device, Nightlatch	ED4200S K157ET M110 M52	630	RU
1 Mort. Cylinder	CR1580 GMK	626	RU
1 Rim Cylinder	CR3580 GMK	626	RU
1 Pull	RM201 Mtg-Type 12XHD	US32D-316	RO
1 Surface Closer	DC8210 A5 M85 M77/M78 (H.O.)	689	RU
1 Threshold	252x3AFG Pemkote MSES25SS		PE
1 Weatherstrip	- integral within construction of door and frame assembly		00
1 Sweep	29326CNB TKSP8		PE
1 Position Switch	DPS-M/W-BK		SU ⚡

Notes: Key outside retracts latch bolt. Keyed cylinder inside controls latch bolt dogging. Free egress always permitted.

Set: 9.0

Doors: 105B

1 Continuous Hinge	HG305 x AS	630	MR
1 Electrified Rim Exit, Fail Secure	ED5200S N9905ET M110 M92 M52	630	RU ⚡
1 Mort. Cylinder	CR1580 GMK	626	RU
1 Rim Cylinder	CR3580 GMK	626	RU
1 Surface Closer	DC8210 A4 M85	689	RU

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1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO	
1 ElectroLynx Harness	QC-C (power transfer to exit device lever trim)		MK	⚡
1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 ElectroLynx Harness	QC-C (power transfer to exit device rail)		MK	⚡
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	
1 Electric Power Transfer	EL-CEPT	630	SU	⚡

Notes: Door normally closed and locked. Valid use of card reader temporarily unlocks lever trim for access. Push rail equipped with built-in signal switch to be wired for request to exit. Free egress always permitted.

Set: 10.0

Doors: 131, 132

3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK
1 Rim Exit Device, Passage	ED5200 N910ET M110	630	RU
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Passage lever trim. Free egress always permitted.

Set: 11.0

Doors: 144

3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK
1 Rim Exit Device, Passage	ED5200 N910ET M110	630	RU
1 Surface Closer	DC6210 A2 (H.O.)	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Passage lever trim. Free egress always permitted.

Set: 12.0

Doors: 106

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3 Hinge, Full Mortise, Hvy Wt	T4A3786 x QC12	US26D	MK	⚡
3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK	
1 Fail Secure Lockset	CLX33905 NZD M92 ACP GMK	626	RU	⚡
1 Surface Closer	DC6200 - pull side mount	689	RU	
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO	
1 Wall Stop	406	US32D	RO	
3 Silencer	608 / 609		RO	
1 ElectroLynx Harness	QC-C (power transfer to lock location)		MK	⚡
1 ElectroLynx Harness	QC-C1500P (power transfer to junction box above)		MK	⚡
1 Position Switch	DPS-M/W-BK		SU	⚡
1 Power Supply	AQL4-R8E1		SU	⚡
1 Card Reader	- Provided by Security Contractor		00	

Notes: Door normally closed and locked. Key override outside retracts latchbolt. Valid use of card reader outside temporarily unlocks outside lever for access. Inside lever function equipped with signal switch for request to exit alarm shunt (REX). Free egress always permitted.

Set: 13.0

Doors: 157, 158

3 Hinge	TA2714 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 NZD ACP GMK	626	RU
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 14.0

Doors: 145, 146, 147, 148

3 Hinge	TA2714 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 NZD ACP GMK	626	RU
1 Surf Overhead Stop	10-X36	652	RF
3 Silencer	608 / 609		RO

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 15.0

Doors: 107, 129

3 Hinge	TA2714 (NRP)	US26D	MK
1 Entrance Lock	CLX3351 NZD ACP GMK	626	RU
1 Wall Stop	409	US32D	RO
3 Silencer	608 / 609		RO

Notes: Latch by either lever unless outside lever is locked by push / turn button in inside lever.
Push button released by key outside or lever inside.
Turn button must be released manually.
Key retracts latch when outside lever is locked.
Free egress at all times.

Set: 16.0

Doors: 109, 125, 127

3 Hinge	TA2714 (NRP)	US26D	MK
1 Passage Latch	CLX3310 NZD	626	RU
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Set: 17.0

Doors: 151B

3 Hinge	TA2714 (NRP)	US26D	MK
1 Passage Latch	CLX3310 NZD	626	RU
1 Surf Overhead Stop	10-X36	652	RF
3 Silencer	608 / 609		RO

Set: 18.0

Doors: 156

3 Hinge	TA2714 (NRP)	US26D	MK
1 Classroom Lock	CLX3355 NZD ACP GMK	626	RU
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Function: Latch bolt by lever either side unless outside lever is locked by key outside. Outside lever remains locked unless unlocked by key. Inside lever always free for egress.

Set: 19.0

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Doors: 122A, 122B, 122C, 128, 205

3 Hinge	TA2714 (NRP)	US26D	MK
1 Classroom Lock	CLX3355 NZD ACP GMK	626	RU
1 Surf Overhead Stop	10-X36	652	RF
3 Silencer	608 / 609		RO

Notes: Function: Latch bolt by lever either side unless outside lever is locked by key outside. Outside lever remains locked unless unlocked by key. Inside lever always free for egress.

Set: 20.0

Doors: 130

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	ML2060 NSA M34 V20	626	RU
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Latchbolt by lever either side, except when outside lever is locked by thumb turn inside.
Operating inside lever, closing door, or operating emergency key outside unlocks outside lever.
Occupancy indicator outside shows "occupied" when outside lever is locked or "vacant" when outside lever is unlocked.
Inside lever always free for egress.

Set: 21.0

Doors: 126

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	ML2060 NSA M34 V20	626	RU
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Latchbolt by lever either side, except when outside lever is locked by thumb turn inside.
Operating inside lever, closing door, or operating emergency key outside unlocks outside lever.
Occupancy indicator outside shows "occupied" when outside lever is locked or "vacant" when outside lever is unlocked.
Inside lever always free for egress.

Set: 22.0

Doors: 111A, 114A, 117A, 120A

3 Hinge	TA2714 (NRP)	US26D	MK
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1 Privacy Lock	ML2060 NSA M34 V20	626	RU
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
1 Smoke / Sound Seal	S88D - head and jambs		PE

Notes: Latchbolt by lever either side, except when outside lever is locked by thumb turn inside.
Operating inside lever, closing door, or operating emergency key outside unlocks outside lever.
Occupancy indicator outside shows "occupied" when outside lever is locked or "vacant" when outside lever is unlocked.
Inside lever always free for egress.

Set: 23.0

Doors: 111B, 114B, 117B, 120B

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	ML2060 NSA M34 V20	626	RU
1 Surface Closer	DC6210 A4	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Smoke / Sound Seal	S88D - head and jambs		PE

Notes: Latchbolt by lever either side, except when outside lever is locked by thumb turn inside.
Operating inside lever, closing door, or operating emergency key outside unlocks outside lever.
Occupancy indicator outside shows "occupied" when outside lever is locked or "vacant" when outside lever is unlocked.
Inside lever always free for egress.

Set: 24.0

Doors: 104, 152A, 152B

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	CLX3320 NZD	626	RU
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	409	US32D	RO
3 Silencer	608 / 609		RO

Set: 25.0

Doors: 110, 112, 113, 115, 116, 118, 119, 121

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	CLX3320 NZD	626	RU
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	409	US32D	RO

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1 Smoke / Sound Seal S88D - head and jambs PE

Set: 26.0

Doors: 108

3 Hinge	TA2714 (NRP)	US26D	MK
1 Privacy Lock	CLX3320 NZD	626	RU
1 Surface Closer	DC6210 A4	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
3 Silencer	608 / 609		RO

Set: 27.0

Doors: 103

3 Hinge	TA2714 (NRP)	US26D	MK
1 Institutional Privacy Lock	ML2069 NSA V20 ACP GMK	626	RU
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Notes: Operation Description: Latchbolt by lever either side, except when lever outside is locked by thumbturn inside. Operating inside lever or closing door unlocks outside lever. Key outside retracts latchbolt at all times, even if thumbturn is held in locked position.

Set: 28.0

Doors: 102B

3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 NZD ACP GMK	626	RU
1 Conc Overhead Stop	2-X36	652	RF
1 Surface Closer	DC6200 - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
3 Silencer	608 / 609		RO

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 29.0

Doors: 200

3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK
1 Passage Latch	CLX3310 NZD	626	RU
1 Surface Closer	DC6210 A2 (H.O.)	689	RU

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DOOR HARDWARE
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1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Set: 30.0

Doors: 201, 203A

3 Hinge (heavy weight)	T4A3786 (NRP)	US26D	MK
1 Passage Latch	CLX3310 NZD	626	RU
1 Surface Closer	DC6210 A5 (H.O.)	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
3 Silencer	608 / 609		RO

Set: 31.0

Doors: 102A

1 Continuous Hinge	CFM-SLF-HD1		PE
1 Passage Latch	CLX3310 NZD	626	RU
1 Surface Closer	DC6200 A1 (H.O.) - pull side mount	689	RU
1 Kick Plate	K1050 10" high x 2" LDW 4BE CSK	US32D	RO
1 Wall Stop	406	US32D	RO
3 Silencer	608 / 609		RO

Set: 32.0

Doors: 101A, 101B, 101C

1 Hardware	- Provided by Four-Fold Steel Door Manufacturer		OT
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Set: 33.0

Doors: 101D, 101E, 101F, 160B

1 Hardware	- Provided by Overhead Door Section		OT
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END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Glazing for doors, interior borrowed lites, storefront framing.
 - 2. Fire-rated glazing units.
 - 3. Glazing sealants and accessories.

1.2 RELATED SECTIONS

- A. 083453 - Bullet Resistant Wood Door & Frame Assembly
- B. 085653 - Bullet Resistant Transaction Windows

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

- A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.8 WARRANTY

- A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Vitro Architectural Glass. or comparable product by one of the following:
 - 1. AGC Glass Company North America, Inc.
 - 2. Guardian Industries Corp.; SunGuard.
 - 3. Oldcastle BuildingEnvelope™.
 - 4. Pilkington North America.
 - 5. Schott North America, Inc.
 - 6. Trulite Glass & Aluminum Solutions, LLC.
 - 7. Viracon, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
 2. Design Snow Loads: <Insert design snow load> [As indicated on Drawings].
 3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Glazing Manual."
 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IgCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.
- C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- D. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- E. Ceramic-Coated Spandrel Glass: ASTM C1048, Type I, Condition B, Quality-Q3.
 - 1. Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 - 1. Sealing System: Dual seals.
 - 2. Spacer: Aluminum with mill or clear anodic finish.

2.6 FIRE-RATED GLASS

- A. Fire-rated Glass Units: Fire-rated glazing material listed for use in transoms and borrowed lites, and non-impact safety-rated.
- B. Fire-rated Glass Units: Fire-rated glazing material listed for use in doors, sidelites, transoms and borrowed lites, and impact safety-rated as ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).
- C. Fire-rated Insulated Glass Units: Fire-rated Insulated glazing material listed for use in transoms and borrowed lites, and non-impact safety-rated.
- D. Fire-rated Insulated Glass Units: Fire-rated Insulated glazing material listed for use in doors, sidelites, transoms and borrowed lites, and impact safety-rated as ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

2.7 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 1. AAMA 804.3 tape, where indicated.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

- D. 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.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. 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.
- F. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.4 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

3.5 MONOLITHIC GLASS SCHEDULE

- A. Glass Type (MG-10): Clear annealed or heat-strengthened float glass.
 - 1. Minimum Thickness: 6 mm.
- B. Glass Type (MG-11): Clear fully tempered float glass.
 - 1. Minimum Thickness: 6 mm.

3.6 INSULATING GLASS SCHEDULE

- A. Glass Type (IG-10): Low-E-coated, tinted insulating glass.
 - 1. Basis-of-Design Product: Vitro Architectural Glass, "Solar Bronze+Solarban 60 Clear", Low-E, Insulated Glass.
 - a. Overall Unit Thickness: 1 inch (25 mm).
 - b. Minimum Thickness of Each Glass Lite: 6 mm.
 - c. Outdoor Lite: Tinted annealed or heat-strengthened float glass.
 - d. Tint Color: Bronze.
 - e. Interspace Content: Air.
 - f. Indoor Lite: Clear annealed or heat-strengthened float glass.
 - g. Low-E Coating: Sputtered on third surface.
 - a. Winter Nighttime U-Factor: .29 maximum.
 - b. Summer Daytime U-Factor: .27 maximum.
 - c. Shading Coefficient: .37 maximum.
 - d. Visible Light Transmittance: 42 percent minimum.
 - e. Solar Heat Gain Coefficient: .32 maximum.
- B. Glass Type (IG-11): Low-E-coated, tinted, fully tempered, insulating glass.
 - 1. Basis-of-Design Product: Same as IG-10 above, but fully tempered
- C. Glass Type (IG-12): Low-E-coated, tinted, fully tempered, laminated insulating glass.

1. Basis-of-Design Product: Same as IG-10 above, but fully tempered, laminated glass.

3.7 FIRE-RATED GLASS SCHEDULE

- A. Glass Type (LG-10): monolithic, clear, 20-minute fire-rated glass.

1. Basis-of-Design Product: "Firelite" as manufactured by TGP Technical Glass Products, (800) 426.0279, or approved equal.
 - a. Overall Unit Thickness: 3/16 inch (5 mm).
 - b. Tint Color: Clear
 - a. Visible Light Transmittance: 88 percent.
 - b. Visible Light Reflection: 9 percent.
 - c. Hardness (Vicker's Scale): 700.
 - d. Fire rating 20.
 - e. Impact safety rating: None
 - f. STC Rating: 35.

- B. Glass Type (LG-11): monolithic, clear, laminated 45-minute fire-rated, impact safety glass.

1. Basis-of-Design Product: "Firelite-Plus" as manufactured by TGP Technical Glass Products, (800) 426.0279, or an approved equivalent product from SAFTIFIRST or another qualified manufacturer.
 - g. Overall Unit Thickness: 5/16 inch (5 mm).
 - h. Tint Color: Clear
 - a. Visible Light Transmittance: 85 percent.
 - b. Visible Light Reflection: 9 percent.
 - c. Hardness (Vicker's Scale): 700.
 - d. Fire rating 45 minutes.
 - e. Safety rated glazing.
 - f. Impact safety rating: Meets ANSI Z97.1 and CPSC 16CFR1201 (Cat I and II)
 - g. STC Rating: 38.

- C. Bullet Resistant Glazing: Refer to following sections for bullet resistant rated glazing.

1. 083453 - Bullet Resistant Wood Door & Frame Assembly.
2. 085653 - Bullet Resistant Transaction Windows

END OF SECTION 088000

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed formed-metal louvers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.
- B. Windborne-debris-impact-resistance test reports.
- C. Sample warranties.

1.4 QUALITY ASSURANCE

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

1.5 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- 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.

2.2 FIXED FORMED-METAL LOUVERS

- A. Horizontal Drainable-Blade Louver, Extruded Aluminum:
 - 1. Basis of Design: Subject to compliance with requirements, provide products from Greenheck Fan Corporation, ESD Series.
 - 2. 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. Cesco Products; a division of MESTEK, Inc.
 - b. Construction Specialties, Inc.
 - c. Industrial Louvers Inc.
 - d. NCA Manufacturing, Inc.
 - e. Ruskin Company.
 - 3. Louver:
 - a. Greenheck Model ESD-635, depth 6 inches at masonry walls.
 - b. Greenheck Model ESD-403, depth 4 inches at aluminum storefront framing.
 - 4. Frame and Blade Material and Nominal Thickness: Not less than 0.080 inch (2.03 mm) for blades and 0.080 inch (2.03 mm) for frames:
 - 5. Material Heavy gauge extruded 6063-T5 aluminum.
 - 6. Mullion Type: Fully Recessed.
 - 7. Wind Load: 25 psf
 - 8. Size: As indicated on the drawings.
 - 9. Performance Requirements: minimum CFM requirements indicated on drawings.
 - 10. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
 - 3. Fasteners: Stainless steel
- B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening for Galvanized-Steel Louvers:
 - 1. Bird Screening: Aluminum: 1/2-inch- (13-mm-) square mesh, 0.063-inch (1.60-mm) wire.
 - 2. Insert other screening materials as required, including bronze and glass fiber.

2.4 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E 488/E 488M conducted by a qualified testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 FABRICATION

- 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, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

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FIXED LOUVERS
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2.6 ALUMINUM FINISHES

- A. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. 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.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions.
 - 2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

- A. Sample Panels: Build sample wall to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample of typical exterior wall, minimum dimension of 60 inches (1500 mm) long by 48 inches (1200 mm) high by full thickness. Show all wall components including by not limited to: Metal studs, sheathing, vapor barrier, insulation, flashing, masonry, masonry accessories, etc. Include window jamb and sill as well. Coordinate with other sections.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0269 inch (0.683 mm) or as required by performance requirements for horizontal deflection.
 - b. Depth: As indicated on Drawings

- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
 2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a.
 - b. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Steel Network Inc. (The); VertiClip SLD Series.
 - 2) Superior Metal Trim; Superior Flex Track System (SFT).
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0269 inch (0.683 mm).
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0296 inch (0.752 mm).
 2. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.
- H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.0179 inch (0.455 mm), and 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- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: As indicated on Drawings.

- D. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 - 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0269 inch (0.683 mm).
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Metal Thickness: 0.0296 inch (0.752 mm).
 - 4. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.

- E. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; 640-C Drywall Furring System.
 - c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. 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 one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

- D. Install bracing at terminations in assemblies.
- E. 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 that penetrate 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 (13-mm) 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. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Z-Shaped Furring Members:
 - 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches (610 mm) o.c.
 - 2. 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 (305 mm) from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) 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 required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Do not attach hangers to steel roof deck.
 - 5. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Exterior gypsum board for ceilings and soffits.
 - 3. Tile backing panels.

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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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.
- B. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E119 by an independent testing agency.

2.2 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.

2.3 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated.
 - 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. American Gypsum Co.

- b. BPB America Inc.
 - c. Georgia-Pacific Gypsum.
 - d. Gold Bond
 - e. Lafarge North America Inc.
 - f. National Gypsum Company.
 - g. PABCO Gypsum.
 - h. Temple.
 - i. USG Corporation.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch (15.9 mm).
 2. Long Edges: Tapered.
- C. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: 1/4 inch (6.4 mm).
 2. Long Edges: Tapered.
- D. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
1. Thickness: 1/2 inch (12.7 mm).
 2. Long Edges: Tapered.
- E. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Thickness: 5/8 inch (15.9 mm), Type X.
 2. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 3. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
 4. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 5. Hard-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- F. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Core: 5/8 inch (15.9 mm), Type X.
 2. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
 3. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
 4. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
 5. Long Edges: Tapered.
 6. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- G. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: 5/8 inch (15.9 mm), Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- 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: Subject to compliance with requirements, provide "DensGlass Sheathing" by Georgia-Pacific Gypsum or equal.
 2. Core: 5/8 inch (15.9 mm), Type X.

2.5 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Basis of Design: Subject to compliance with requirements, provide "DensShield Tile Backer" by Georgia-Pacific Gypsum or equal.
 2. Core: 5/8 inch (15.9 mm), Type X.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
 2. 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.
- B. Exterior Trim: ASTM C 1047.
1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:

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1. Interior Gypsum Board: As recommended by panel manufacturer.
 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass 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 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.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 4. Finish Coat: For third coat, 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 (0.84 to 2.84 mm) thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: As specified in Section 072100 "Thermal Insulation."
- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

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- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- 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 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 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- 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.

END OF SECTION 092900

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Glazed ceramic wall tile.
 - 3. Solid polymer thresholds.
 - 4. Waterproof membrane for thinset applications.
 - 5. Crack isolation membrane.
 - 6. Metal edge strips.

1.2 RELATED SECTIONS

- A. Division 9: Non-Structural Metal Framing
- B. Division 9: Gypsum Board

1.3 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.
 - 2. Solid polymer thresholds.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 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 5 percent of amount installed for each type (but not less than 10 full size units of each type), composition, color, pattern, and size indicated.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
1. 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. Tile Type (PT-1): Unglazed porcelain tile – Floor Tile.
1. Basis of Design: Subject to compliance with requirements, provide Virginia Tile “Urban Living” porcelain floor tile.
 2. Face Size: 2” x 2”.
 3. Thickness: 10 mm.
 4. Finish: Matte
 5. Dynamic Coefficient of Friction: ≥ 0.42 .
 6. Water Absorption: $\leq 0.4\%$.
 7. Pattern: Refer to floor finish plans.
 8. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.
 9. Grout Color: Refer to ‘Material Finish / Color Schedule Section 000200’ for color selections.
- B. Tile Type (PT-2): Unglazed porcelain tile – Cove Base Tile.
1. Basis of Design: Subject to compliance with requirements, provide Virginia Tile “Urban Living” porcelain cove base tile.
 2. Face Size: 6” x 12” cove base.
 3. Finish: Matte
 4. Dynamic Coefficient of Friction: ≥ 0.42 .
 5. Water Absorption: $\leq 0.4\%$.
 6. Pattern: Refer to floor finish plans and elevations.
 7. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.
 8. Grout Color: Refer to ‘Material Finish / Color Schedule Section 000200’ for color selections.
- C. Tile Type (PT-3): Glazed ceramic tile – Wall Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean “Color Story” glazed ceramic wall tile.
2. Face Size: 3” x 6”.
3. Thickness: 5/16 inches.
4. Finish: Matte
5. Dynamic Coefficient of Friction: ≥ 0.42 .
6. Water Absorption (ASTM C373): $< 20.0\%$.
7. Scratch Hardness (MOHS): 4.0 – 6.0
8. Pattern: Refer to floor finish plans and elevations.
9. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.
10. Grout Color: Refer to ‘Material Finish / Color Schedule Section 000200’ for color selections.

D. Tile Type (PT-4): Glazed ceramic tile – Wall Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean “Color Story” glazed ceramic wall tile.
2. Face Size: 6” x 6”.
3. Thickness: 5/16 inches.
4. Finish: Gloss
5. Dynamic Coefficient of Friction: ≥ 0.42 .
6. Water Absorption (ASTM C373): $< 20.0\%$.
7. Scratch Hardness (MOHS): 4.0 – 6.0
8. Pattern: Refer to floor finish plans and elevations.
9. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.
10. Grout Color: Refer to ‘Material Finish / Color Schedule Section 000200’ for color selections.

E. Tile Type (PT-5): Glazed ceramic tile – Accent Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean “Color Story” glazed ceramic accent tile.
2. Face Size: 1/2” x 12”.
3. Thickness: 5/16 inches.
4. Finish: Gloss
5. Dynamic Coefficient of Friction: ≥ 0.42 .
6. Water Absorption (ASTM C373): $< 20.0\%$.
7. Scratch Hardness (MOHS): 4.0 – 6.0
8. Pattern: Refer to floor finish plans and elevations.
9. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.
10. Grout Color: Refer to ‘Material Finish / Color Schedule Section 000200’ for color selections.

F. Tile Type (PT-6): Glazed ceramic tile – Chair Rail Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean “Linea” glazed ceramic chair rail tile.
2. Face Size: 2” x 6”.
3. Finish: Gloss
4. Dynamic Coefficient of Friction: ≥ 0.42 .
5. Water Absorption (ASTM C373): $< 20.0\%$.
6. Scratch Hardness (MOHS): 4.0 – 6.0
7. Pattern: Refer to floor finish plans and elevations.
8. Tile Colors: Refer to ‘Material Finish / Color Schedule Section 000200’.

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9. Grout Color: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

G. Tile Type (PT-7): Porcelain tile – Floor Tile.

1. Basis of Design: Subject to compliance with requirements, provide Crossville "Owen Stone" porcelain floor tile.
2. Face Size: 12" x 24".
3. Thickness: 9.5 mm.
4. Finish: Textured (EXT)
5. Dynamic Coefficient of Friction: ≥ 0.60 .
6. Water Absorption (ASTM C373): $< 0.50\%$.
7. Scratch Hardness (MOHS): 7.0
8. Pattern: Refer to floor finish plans.
9. Tile Colors: Refer to 'Material Finish / Color Schedule Section 000200'.
10. Grout Color: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

H. Tile Type (PT-8): Porcelain tile – Coved Base Tile.

1. Basis of Design: Subject to compliance with requirements, provide Crossville "Owen Stone" porcelain coved wall base tile.
2. Face Size: 6" x 12".
3. Thickness: 9.5 mm.
4. Finish: (UPS)
5. Dynamic Coefficient of Friction: ≥ 0.60 .
6. Water Absorption (ASTM C373): $< 0.50\%$.
7. Scratch Hardness (MOHS): 7.0
8. Pattern: Refer to floor finish plans.
9. Tile Colors: Refer to 'Material Finish / Color Schedule Section 000200'.
10. Grout Color: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

I. Tile Type (PT-9): Glazed ceramic tile – Wall Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean "Color Story" glazed ceramic wall tile.
2. Face Size: 3" x 6".
3. Thickness: 5/16 inches.
4. Finish: Matte
5. Dynamic Coefficient of Friction: ≥ 0.42 .
6. Water Absorption (ASTM C373): $< 20.0\%$.
7. Scratch Hardness (MOHS): 4.0 – 6.0
8. Pattern: Refer to floor finish plans and elevations.
9. Tile Colors: Refer to 'Material Finish / Color Schedule Section 000200'.
10. Grout Color: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

J. Tile Type (PT-10): Glazed ceramic tile – Accent Tile.

1. Basis of Design: Subject to compliance with requirements, provide American Olean "Color Story" glazed ceramic wall tile.
2. Face Size: 3" x 6".
3. Thickness: 5/16 inches.

4. Finish: Matte
5. Dynamic Coefficient of Friction: ≥ 0.42 .
6. Water Absorption (ASTM C373): $< 20.0\%$.
7. Scratch Hardness (MOHS): 4.0 – 6.0
8. Pattern: Refer to floor finish plans and elevations.
9. Tile Colors: Refer to 'Material Finish / Color Schedule Section 000200'.
10. Grout Color: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes. Refer to drawings for required profiles.
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/4 inch or less above adjacent floor surface.

2.4 TILE BACKING PANELS

- A. Coated Glass-Mat, Water-Resistant Gypsum Backing Panel: ASTM C1178/C1178M, with a water-resistant coating on one surface, and manufacturer's standard edges. Refer to Section 092900 Gypsum Board.

2.5 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
1. 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/A 185M and ASTM A 82/A 82M, 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. ARDEX GmbH.
 - b. Boiardi Products Corporation; a QEP company.
 - c. Bonsal American, an Oldcastle company.
 - d. Bostik, Inc.
 - e. Laticrete International, Inc.
 - f. MAPEI Corporation.
 - g. TEC; H.B. Fuller Construction Products Inc.
 2. For wall applications, provide nonsagging mortar.
 3. Provide prepackaged, dry mortar mix to which only water must be added at project site.

2.6 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. ARDEX GmbH.
 - b. Boiardi Products Corporation; a QEP company.
 - c. Bonsal American, an Oldcastle company.
 - d. Bostik, Inc.
 - e. Custom Building Products.
 - f. Laticrete International, Inc.
 - g. MAPEI Corporation.
 - h. TEC; H.B. Fuller Construction Products Inc.
1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.

2.7 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Basis of Design: Provide Custom Building Products "Red Guard Liquid Waterproofing and Crack Prevention Membrane" or a comparable product from one of the following:
 - a. Bonsal American
 - b. Bostik, Inc.
 - c. H.B. Fuller
 - d. Laticrete
 - e. Mapei

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, designed specifically for wall and flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
 - c. Schluter Systems L.P.
- C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

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 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. Remove coatings, including curing compounds or other coatings, that are incompatible with tile-setting materials.
- B. 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.
- C. At all showers, prepare substrates to receive waterproofing membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains: Install 2" mortar bed with two x two inch 16/16 wire mesh. Refer to membrane and tile manufacturer data for thickness to be included in depression.
- D. 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.
- E. Substrate Flatness:
 - 1. For tile shorter than 15 inches (381 mm), confirm that structure or substrate is limited to variation of 1/4 inch in 10 ft. (6.4 mm in 3 m) from the required plane, and no more than 1/16 inch in 12 inches (1.5 mm in 300 mm) when measured from tile surface high points.
 - 2. For large format tile, tile with at least one edge 15 inches (381 mm) or longer, confirm that structure or substrate is limited to 1/8 inch in 10 ft. (3 mm in 3 m) from the required plane, and no more than 1/16 inch in 24 inches (1.5 mm in 609 mm) when measured from tile surface high points.

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 (200 by 200 mm) or larger.
 - c. Tile floors consisting of rib-backed tiles.
- 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. Glazed Wall Tile: 1/16 inch.
 - 2. Porcelain Tile: 3/16 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Movement Joints: Provide movement joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated on Drawings. Form joints during installation of setting materials, mortar beds, and tile. Keep joints free of dirt, debris, and setting materials prior to filling with sealants. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Thresholds: Install stone and solid surface 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 [modified dry-set or improved modified dry-set mortar (thinset)].

2. Do not extend waterproof membrane under thresholds set in standard dry-set, modified dry-set, or improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproof membrane or crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips:

1. Install where indicated on drawings
2. Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 WATERPROOFING INSTALLATION

- A. 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.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 1. Remove grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 1. Porcelain Tile Installation (Typical floor areas): TCNA F113; thinset mortar.

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- a. Porcelain Tile Type: Typical floor tile (PT-1).
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: High-performance sanded grout.
 2. Porcelain Tile Installation (Shower Areas): TCNA F121 and ANSI A108.1C; cement mortar bed (thickset) on waterproof membrane.
 - a. Porcelain Tile Type: Mosaic floor tile (PT-2).
 - b. Bond Coat for Cured-Bed Method: Modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
- B. Interior Wall Installations, Masonry or Concrete:
1. Ceramic Tile Installation (Shower Areas): TCNA B421; thinset mortar on waterproof membrane over solid backing.
 - a. Ceramic Tile Type: Glazed wall tile (CT-1, CT-2, CT-3).
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
 2. Ceramic Tile Installation (Non-Shower Areas): TCNA W202; thinset mortar.
 - a. Ceramic Tile Type: Glazed wall tile.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

END OF SECTION 093013

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed finish.
- C. Product test reports.
- D. Research/evaluation reports.
- E. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory.
- B. Fire-Test-Response Characteristics:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.
 - a. Smoke-Developed Index: 450 or less.
- C. Preinstallation Conference: Conduct conference at Project site.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, GENERAL

- A. Acoustical Tile Standard: Comply with ASTM E 1264.
- B. Metal Suspension System Standard: Comply with ASTM C 635.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm) diameter wire.
- E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING (ACT-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG "Olympia Micro Clima Plus" or comparable product by Armstrong or Certainteed.
- B. Color: White
- C. Modular Size: 2' x 2' x 3/4"
 1. USG – Olympia Micro Clima Plus #4752
 2. Edge: Tegular edge.
 3. NRC Rating: 0.60.
 4. LR: 0.86
 5. Fire Rating: Class A

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING (ACT-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG "Donn DX" or a comparable product by one of the following:
 1. Armstrong
 2. Chicago Metallic Corp.

- B. Color: White.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders.
- C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
 - 2. Do not attach hangers to steel deck tabs.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely. Provide
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE (RB-1, RB-2)

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide Roppe Corporation "Pinnacle Rubber Wall Base" or equal product by the following:
 - a. Allstate Rubber Corp.; Stoler Industries.

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- b. Armstrong World Industries, Inc.
- c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
- d. Endura Rubber Flooring; Division of Burke Industries, Inc.
- e. Estrie Products International; American Biltrite (Canada) Ltd.
- f. Flexco, Inc.
- g. Johnsonite
- h. Mondo Rubber International, Inc.
- i. Musson, R. C. Rubber Co.
- j. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
- k. PRF USA, Inc.
- l. VPI, LLC; Floor Products Division.

B. Resilient Base Standard: ASTM F 1861.

- 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
- 2. Manufacturing Method: Group 1 (solid, homogeneous).
- 3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: As noted on drawings. If not indicated on drawings, provide 4" high base.

E. Lengths: Coils in manufacturer's standard length.

F. *Outside Corners: Standard rubber cove base (not pre-formed)*

G. *Inside Corners: Standard rubber cove base (not pre-formed)*

H. Flammability: Class B

I. Finish: Low luster.

J. Colors and Patterns: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

- 1. Manufacturers: Subject to compliance with requirements, provide Roppe Corporation Resilient Molding Accessories or equal products by the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Flexco, Inc.
 - c. Johnsonite
 - d. R.C.A. Rubber Company (The).
 - e. VPI, LLC; Floor Products Division.

B. Nosing for resilient floor covering, Reducer strip for resilient floor covering and Transition strips.

C. Material: Rubber.

- D. Profile and Dimensions: As indicated on drawings.
- E. Colors and Patterns: Refer to 'Material Finish / Color Schedule Section 000200' for color selections.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- C. 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.
- D. 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.

- E. 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.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coat(s).
- C. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Resilient Tile Flooring (RFT).

1.2 Related Sections:

- A. Section 033000 CAST-IN-PLACE CONCRETE

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
 2. ASTM F1859 Standard Specification for Rubber Sheet Floor Covering Without Backing
 3. ASTM F1860 Standard Specification for Rubber Sheet Floor Covering with Backing
- B. National Fire Protection Association (NFPA):
 1. NFPA 253: Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
 2. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 1. Show details of special patterns.
- C. Samples: Full-size units of each color and pattern of floor tile required.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience with resilient flooring of type equivalent to those specified.

- B. Installer Qualifications: Acceptable to manufacturer of resilient flooring with a minimum of 4 years' experience with resilient flooring of type equivalent to those specified.
- C. 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.8 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 WARRANTY

- A. Provide manufacturer's standard limited warranty for wear, defect, bond, and conductivity.

PART 2 - PRODUCTS

2.1 RESILIENT TILE FLOORING (RTF-1)

- A. Basis-of-Design: nora systems, Inc., 9 Northeastern Blvd., Salem, NH 03079; telephone 800-332-NORA or 603-894-1021.
- B. Products: Subject to compliance with requirements, provide Nora by Interface "Norament 926 Arago-3118" rubber tile flooring or a comparable product from the following:
 - 1. ASTM F1344: Rubber Floor Tile.
 - 2. Type: IB, Grade 2.
 - 3. Material Vulcanized rubber compound
 - 4. Composition: Homogeneous rubber compound with random scattered design.

5. Surface: Relief Structure.
6. Back of Tile: Double Sanded smooth.
7. Size (ASTM F2055): 39.53 inches by 19.76 inches (1004 mm by 502 mm).
8. Thickness (ASTM F386): 0.14 inches (3.5 mm).
9. Dimensional Stability (ASTM F 2199): $\pm 0.2\%$.
10. Hardness (ASTM D2240): 82, Shore A
11. Abrasion Resistance (ASTM D3389): 0.008 oz. weight loss.
12. Flammability (ASTM E648/NFPA 253): NBSIR 75 950, 0.92
13. Smoke Density (ASTM E662/NFPA 258): NBS, 267 (flaming) and 130 (non-flaming)
14. Surface Burning (CAN/ULC-S102.2): FSC1 of 75 and SD of 470
15. Slip Resistance (ASTM D2047): Static coefficient of friction, Neolite dry 0.81, Neolite wet 0.87
16. Colors and Patterns: Refer to 'Material Finish / Color Schedule Section 000200'

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 floor tile manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Perform tests recommended by floor covering manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
 1. At existing concrete slabs scheduled to receive resilient floor tile, skimcoat entire existing surface with trowelable leveling and patching compound.

- D. Areas with direct prolonged exposure to sunlight should be protected with the use of Low E glass doors, windows or facades that reduce the UV transmissions to less than 1%.
- E. Areas of the flooring subjected to direct sunlight, for example through doors or windows, must be covered using blind, curtains, cardboard, or similar materials for 24-hours before, during, and for a period of 72-hours after the installation to allow "wet" adhesives to cure. Do not allow traffic when using wet set adhesives for a minimum of 12-hours and prohibit rolling loads for 72-hours. All flooring must be protected from damage during construction operations using Masonite, plywood, or a similar product. Before laying the panels, the flooring surface must be free of all debris. Lay panels so that they are edge to edge and tape the joints to prevent movement and debris entrapment. Inspect the flooring before covering and after removal for final acceptance.
- F. Do not install floor tiles until they are the 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.
- G. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Provide manufacturer approved trained installers.
- C. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis or as indicated.
- D. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- E. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rubber sheet flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details and seam locations for sheet flooring.
- C. Samples: For each exposed product and for each type, color, and pattern specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Sheet Rubber Flooring Installer Qualifications: An experienced installer who has completed sheet rubber flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

PART 2 - PRODUCTS

2.1 RUBBER SHEET FLOORING (SF-1)

- A. Description: Rubber athletic flooring provided as rolled goods for adhered installation.
- B. Basis of Design Manufacturers: Subject to compliance with requirements, provide "Decathlon" from Mats, Inc., or another approved equivalent product from one of the following manufacturers:
 - 1. "Prime Sports" by Flexco
 - 2. "Rubber Sports Flooring" by Timeless Designs
 - 3. Or similar.
- C. Material: Black recycled rubber made with pre-consumer and post-consumer recycled content with EPDM colored granules.
 - 1. Roll Size: 48 inches wide by longest length that is practical to minimize splicing during installation.

2. Thickness: 9.0 mm
3. Hardness per ASTM D-2240: 60
4. Density per ASTM F-3676: 60 lbs/cu. ft.
5. Tensile Strength per ASTM D-412: >220 PSI.
6. Coefficient of Friction per ASTM D-1894.95: >.9

D. Color and Pattern: Refer to Section 000200 Material Finish / Color Schedule

2.2 ACCESSORIES

- A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.
- B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Alkalinity Testing as required by manuf. selected.
 3. Moisture Testing: as required by manuf. selected.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FLOORING INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.

- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.3 SHEET FLOORING INSTALLATION

- A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.
- B. Lay out sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Locate seams according to approved Shop Drawings.
- C. Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- D. Vinyl Sheet Flooring Seams: Prepare and finish seams to produce surfaces flush with adjoining flooring surfaces.
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless flooring.
 - 2. Chemically Bonded Seams: Comply with ASTM F 693. Seal seams to prevent openings from forming between cut edges and to prevent penetration of dirt, liquids, and other substances into seams.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing flooring installation:
 - 1. Remove adhesive and other blemishes from flooring surfaces.
 - 2. Sweep and vacuum flooring thoroughly.
 - 3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.
- B. Protect flooring 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.
 - 1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096566

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Type, color, and location of insets and borders.
 - 8. Type, color, and location of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
- C. Samples: For each exposed product and for each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 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. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the manufacturer.
- B. Provide flooring products and accessories from one manufacturer to ensure compatibility

1.8 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. CPT-1: Manufacturer's standard Limited Lifetime Warranties from date of Substantial Completion.
 - b. CPT-2 and CPT-3: Manufacturer's standard Limited Lifetime Warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide J & J Flooring, "Incognito Walk Off Modular - 7069" or approved equal.
 - 1. Color: As listed in Material Finish / Color Schedule 000200.
 - 2. Construction: Textured Pattern Loop
 - 3. Fiber Type: Encore SD nylon (with recycled content).
 - 4. Dye Method: 100% Solution Dyed.
 - 5. Pile Density: 8,717 oz./cu. yd. (323.23 kg/m³).
 - 6. Stitches: 12.0 stiches per inch (4.72 stitches/cm).
 - 7. Gage: 1/12.
 - 8. Face Weight: 29.0 oz./sq. yd. (983 grams/m²).
 - 9. Primary Backing: Manufacturer's standard synthetic materials.
 - 10. Size: 24 by 24 inches (60.96 cm x 60.96 cm).
 - 11. Applied Soil-Resistance Treatment: Manufacturer's standard material.
 - 12. Flooring Radiant Panel: Class 1
 - 13. Smoke Density: Less than 450 (ASTM E662)

14. Static Test: Less than 3 kv (AATCC-134)

2.2 CARPET TILE (CPT-2)

A. Basis-of-Design Product: Subject to compliance with requirements, provide J & J Flooring, "Umbra Stripe II Plank - 1820" or approved equal.

1. Color: As listed in Material Finish / Color Schedule 000200.
2. Construction: Textile Composite
3. Dye Method: Solution Dyed.
4. Wear Layer: 100% Solution Dyed Polyester.
5. Total Thickness: 0.205 inches.
6. Total Weight: 4.5 oz. to 5.2 oz. /sq. yd.
7. Primary Backing: Polyester Felt Cushion.
8. Size: 18 by 36 inches modules.
9. Flooring Radiant Panel: Class 1
10. Smoke Density: Less than 450 (ASTM E662)
11. Static Test: Less than 3 kv (AATCC-134)

2.3 CARPET TILE (CPT-3)

A. Basis-of-Design Product: Subject to compliance with requirements, provide J & J Flooring, "Pop - 1816" or approved equal.

1. Color: As listed in Material Finish / Color Schedule 000200.
2. Construction: Textile Composite
3. Dye Method: Solution Dyed.
4. Wear Layer: 100% Solution Dyed Polyester.
5. Total Thickness: 0.205 inches.
6. Total Weight: 4.5 oz. to 5.2 oz. /sq. yd.
7. Primary Backing: Polyester Felt Cushion.
8. Size: 18 by 36 inches modules.
9. Flooring Radiant Panel: Class 1
10. Smoke Density: Less than 450 (ASTM E662)
11. Static Test: Less than 3 kv (AATCC-134)

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Concrete Slabs:

1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer. Review with Architect for approval.

- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Install carpet tile recessed plate attached to all flush mounted floor electrical / communications boxes.
- J. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099113 - 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.

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. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - 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 2 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. 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.
- B. Colors: As indicated in Material Finish / Color Schedule.

2.2 METAL PRIMERS

- A. Water Based Metal Primer for Galvanized Surfaces: MPI #134
 - 1. VOC Content: E Range of E1.

2.3 EXTERIOR LATEX PAINTS

- A. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. 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 System: MPI EXT 5.3A.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).

END OF SECTION 099113

SECTION 099123 - 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 masonry units (CMU).
 2. Steel.
 3. Galvanized metal.
 4. 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.
- 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.
 3. Finishes are to be as follows:
 - a. All gypsum board soffits and ceilings shall receive a 'G1' flat finish.
 - b. All gypsum board walls shall receive a 'G3' egg shell finish.
 - c. All hollow metal doors, door frames and other ferrous metal surfaces shall receive a 'G5' semi-gloss finish.
- 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. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - 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 2 gal. of each material, finish, and color applied.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

- A. 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.
- B. VOC Content 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); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 4. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 5. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 6. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 7. Floor Coatings: VOC not more than 100 g/L.
 8. Shellacs, Clear: VOC not more than 730 g/L.
 9. Shellacs, Pigmented: VOC not more than 550 g/L.
 10. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
 11. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
 12. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. 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).
2. 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.

D. Colors: As indicated in Material Finish / Color Schedule.

2.2 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
 1. VOC Content: E Range of E2.
- B. Interior/Exterior Epoxy Block Filler: MPI #116.
 1. VOC Content: E Range of E2.

2.3 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.
 1. VOC Content: E Range of E1.

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2.4 METAL PRIMERS

- A. Quick-Drying Alkyd Metal Primer: MPI #76.
 - 1. VOC Content: E Range of E1.

2.5 LATEX PAINTS

- A. Interior Latex (Flat): MPI #53 (Gloss Level 1).
 - 1. VOC Content: E Range of E1.
- B. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
 - 1. VOC Content: E Range of E1.
- C. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.6 QUICK-DRYING ENAMELS

- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - 1. VOC Content: E Range of E1.

2.7 ALKYD PAINTS

- A. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).
 - 1. VOC Content: E Range of E2.
 - 2. Environmental Performance Rating: EPR 1.

2.8 EPOXY

- A. Interior / Exterior Epoxy (water based): MPI #115.
- B. Pigmented Epoxy / Polyamide: MPI #77.

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. Wood: 15 percent.
 - 3. 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. 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. 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. Telephone backer boards.
 - b. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- E. 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.

- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

- 1. Epoxy System: MPI INT 4.2G.
 - a. Prime Coat: Interior/exterior epoxy block filler.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior/Exterior epoxy (water based).

B. Steel Substrates:

- 1. Quick-Drying Enamel System: MPI INT 5.1A. (Use on Hollow Metal Frames, Stairs, Steel Lintels)
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel (semigloss).
- 2. Water-Based Dry-Fall System, MPI INT 5.1C: . Use on Exposed Steel Roof Framing & Roof Deck)
 - a. Prime Coat: Primer, alkyd, quick dry, for metal,
 - b. Intermediate: Dry fall, latex, flat, same as top coat.
 - c. Topcoat: Dry fall, latex, (flat).

C. Gypsum Board Substrates (Ceilings and Soffits):

- 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).

D. Gypsum Board Substrates (Walls):

- 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 (eggshell).
- 2. Epoxy System MPI INT 9.2E:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood stains.
 - 2. Transparent finishes.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of finish system and in each color and gloss of finish required.
- C. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
- D. Related Sections:
 - 1. Division 6 – Section - Interior Architectural Woodwork

1.3 MOCKUPS

- A. Apply mockups of each finish system indicated and each color selected to demonstrate aesthetic effects and to set quality standards for materials and execution.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- B. Stain Colors: As indicated in a color schedule 000200 - Material Finish and Color Schedule.

2.2 WOOD STAINS

- A. Stain, Interior, Semitransparent, for Interior Wood: Solvent-based, oil or oil/alkyd, semitransparent, pigmented stain for new interior wood surfaces that are to be finished with a clear varnish.

2.3 TRANSPARENT FINISHES

- A. Varnish, Interior, Polyurethane, Water Based, Clear, Satin: Water-based clear satin coating for interior wood trim, frames, doors, trim, paneling and cabinetry.
 - 1. Gloss and Sheen Level: Gloss, Satin
 - a. Gloss of 25 to 35 units measured on 60-degree gloss meter and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Maximum Moisture Content of Interior Wood Substrates: 10 percent, when measured with an electronic moisture meter.

3.2 PREPARATION

- A. 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.
- B. 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.
- 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 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Wood Substrates, Wood Trim, Architectural Woodwork and Wood Board Paneling:

- 1. Semi-Transparent Stain System (STN-1):
 - a. Grade: Premium.
 - b. Finish: AWI-12, polyurethane, water based premium grade.
 - 1). Stain coat.
 - 2). Sealer: minimum 3 coats.
 - 3). Sanding: Sand.
 - 4). Topcoat: 2 coats.
 - c. Stain: As selected by Architect from manufacturer's full range to match existing door finish.
 - d. Color: See Section 000200 – Color and Material Finishes Schedule

END OF SECTION 099300

SECTION 099726 SELF-LEVELING, POLYURETHANE-BASED/CEMENT & AGGREGATE SCREED

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Labor, products, equipment and services necessary for resinous flooring Work in accordance with the contract drawings

1.2 RELATED SECTIONS

- A. Section 033000 - Cast-in-Place Concrete.

1.3 REFERENCES

- A. ASTM C579, Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- B. ASTM D2240, Standard Test Method for Rubber Property—Durometer Hardness.
- C. ASTM D2369, Standard Test Method for Volatile Content of Coatings.
- D. ASTM D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- E. ASTM D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- F. For additional standards please refer to Product Data Sheets

1.4 SUBMITTALS

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including physical properties and colors available.
- C. Product Samples: Submit Architectural Standard samples representative of the final finish, as applied. The Standard shall be approved in writing by the Architect and shall be the final standard of acceptance of the finish.
- D. Maintenance Instructions: Submit manufacturer's maintenance instructions.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - .1 All products covered under this Section shall be produced by a single manufacturer, unless otherwise specified, with a minimum of fifteen (10) years proven production of this type of floor finish product.
- B. Applicator Qualifications:
 - Applicator Experience: Each bidder must have a minimum 5-year's experience in the application of the type of system specified. Contractor shall submit a list of five projects of similar size, scope and complexity.

- C. Mock-Up:
 - .1 Construct one 100 sq.ft. (10 sq.m.) mock-up of each type and color of resinous flooring in location acceptable to Architect/Engineer to demonstrate quality of finished system, complying with manufacturer's instructions.
 - .2 Arrange for Architect/Engineer's review and acceptance, obtain written acceptance before proceeding with Work.
 - .3 Upon acceptance, mock-up shall serve as a minimum standard of quality for the balance of the work of this Section. Mock-up shall be left in place for the duration of the work.
- D. Pre-application Meeting: Convene a pre-application meeting two (2) weeks before start of application of floor coating. Require attendance of parties directly affecting work of this section, including Contractor, Architect, applicator, and manufacturer's representative. Review surface preparation, priming, application, curing, protection, and coordination with other work.

1.6 DELIVERY, STORAGE AND HANDLING

- B. Delivery:
 - .1 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, batch or lot number, and date of manufacture.
 - .2 Material should be delivered to job site and checked for completeness and shipping damage prior to job start.
- C. Storage:
 - .1 Store materials in accordance with manufacturer's written instructions.
 - .2 Keep containers sealed until ready for use. Material should be stored in a dry, enclosed, protected area from the elements.
 - .3 Do not subject material to excessive heat or freezing.
 - .4 Shelf life: Established based on manufacturer's written recommendation for each material being used.
- D. Handling: Protect materials during handling and application to prevent damage or contamination.
- E. Condition materials for use accordingly to manufacturer's written instructions prior to application.
- F. Record material lot number and quantity delivered to jobsite/storage.

1.7 SITE CONDITIONS

- B. Do not install the Work of this Section outside of the following environmental ranges with Manufacturers' written acceptance:
 - .1 Material Temperature: Precondition material for at least 24 hours between 65° to 75°F (18° to 24°C)
 - .2 Ambient Temperature: Minimum/Maximum 50°/85°F (10°/30°C)
 - .3 Substrate Temperature: Minimum/Maximum 50°/85°F (10°/30°C). Substrate temperature must be at least 5°F (3°C) above measured Dew Point.
 - .4 Mixing and Application attempted at Material, Ambient and/or Substrate Temperature conditions less than 65°F (18°C) will result in a decrease in

- product workability and slower cure rates.
 - .5 Relative Ambient Humidity: Minimum ambient humidity 30%, maximum ambient humidity 75% (during application and curing)
 - .6 Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.
 - C. Substrate moisture:
 - .1 Moisture content of concrete substrate must be $\leq 4\%$ by mass as measured with a Tramex[®] CME/CMExpert type concrete moisture meter.
 - .2 Additionally, relative humidity tests may be conducted per ASTM F2170 and values must be $\leq 85\%$.
 - .3 If moisture content of concrete substrate is $> 4\%$ by mass as measured with Tramex[®] CME/CMExpert type and/or if relative humidity tests per ASTM F2170 exceed values $> 85\%$, consider moisture mitigation systems or moisture tolerant primer.
 - D. Utilities, including electric, water, HVAC and permanent lighting to be supplied by General Contractor
 - E. Maintain constant ambient room temperature of plus or minus 15°F (plus or minus 7°C) with a minimum temperature of 50°F (10°C) and maximum temperature of 85°F (30°C). Maintain constant ambient room temperature for 48 hours before, during and after installation, or until cured. Do not apply while ambient and temperatures are rising.
 - F. Erect suitable barriers and post legible signs at points of entry to prevent traffic and trades from entering the work area during application and cure period of the floor.
 - G. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.
 - H. Insure adequate ventilation and air flow.
- 1.8 WARRANTY
- B. Manufacturer's warranty covering the resinous flooring against defects in materials for one year from date of installation.
- PART 2 PRODUCTS
- 2.1 MANUFACTURER
- A. Basis of Design: Resinous flooring system, Sikafloor 24NA PurCem as manufactured by Sika Corporation, Industrial Flooring, 201 Polito Avenue, Lyndhurst, NJ 07071, Phone 201.933.8800, Fax 201.933.6225, www.sikafloorusa.com; or comparable flooring system product by one of the following or an alternate manufacturer.
 - .1 WUCT-CSL by CTM Adhesives
 - .2 Sherwin Williams
- 2.2 SYSTEM (EP-1, EP-2, EP-3)
- A. Resinous flooring system: Sikafloor 24NA PurCem is a self-leveling, medium to heavy duty, solid color, three-component, water dispersed polyurethane-based/cement and aggregate screed. Typically applied at 3/16in.

- .1 Primer: Substrate priming is normally not required under typical circumstances. Substrate porosity/condition determines if primer/scratch coat is required.
- .2 Self-Leveling Mortar: Sikafloor 24NA PurCem applied at 3/16 in.
- .3 Grout Coat: Sikafloor 264 applied between 16-20 mils.
- .4 Topcoat: Sikafloor 340 applied @ 3.5 to 5 mils.

2.3

MATERIALS

- A. Primer: Substrate priming is normally not required under typical circumstances. Substrate porosity/condition determines if primer/scratch coat is required
- B. Self-Leveling Mortar: Sikafloor-24NA PurCem is a self-levelling, medium to heavy duty, solid color, three-component, water dispersed polyurethane-based / cement and aggregate screed. It is designed to provide excellent resistance to abrasion, impact, chemical attack and other physical aggression. Sikafloor-24NA has the following properties:
 - .1 Softening Point: 266°F (130°C)
 - .2 Density (ASTM C905): 16.84 lb./US gal. (2.02 kg/L)
 - .3 Flow: Approx. 11.8 in (300 mm)
 - .4 Service Temperature: - 40°F (- 40°C) min. / 212°F (100°C) max.
 - .5 Compressive Strength (ASTM 579)
 - 24 hrs 3,191 psi (22 MPa)
 - 7 days 5,366 psi (37 MPa)
 - 28 days 5,802 psi (40 MPa)
 - .6 Tensile Strength (ASTM C307): 1,045 psi (6.5 MPa)
 - .7 Flexural Strength (ASTM C580): 2,314 psi (14.7 MPa)
 - .8 Pull-off Strength (ASTM D4541): > 254 psi (> 1.75 MPa) (substrate failure)
 - .9 Thermal Compatibility (ASTM C884): Pass
 - .10 Shore D Hardness (ASTM D2240): 80 - 85
 - .11 Indentation (MIL -PRF -24613): ~ 0%
 - .12 Impact Resistance (ASTM D2794): 5.02 ft - lb (6.81 joules) at 1/8" (3 mm) of thickness
 - .13 Abrasion Resistance (ASTM D4060): CS-17/1,000 cycles/2.2 lb (1,000 g)
 - -0.0052 oz (-0.110 g)
 - H-22/1,000 cycles/2.2 lb (1,000 g)
 - -0.080 oz (-2.26 g)
 - .14 Coefficient of Friction (ASTM D1894-61T):
 - Steel 0.3
 - Rubber: 0.5
 - .15 Thermal Expansion (ASTM D696): 0.89×10^{-5} in/in/°F; (1.6×10^{-5} mm/mm/°C).
 - .16 Water Absorption (ASTM C413): 0.10%
 - .17 Flexural Modulus (ASTM C580): 629,025 psi (4,335.7 MPa)
 - .18 Resistance to Fungi Growth (ASTM G21): Rated 0 (no growth)
 - .19 Resistance to Mold Growth (ASTM D3273): Rated 10 (highest resistance)

- .20 VOC's Components A+B+C: < 5 g/L
- C. Broadcast Aggregate: Sikadur 508 or 509 silica sand.
- D. Grout Coat: Sikafloor 264 is a 100 % solids, low VOC, low odor, high gloss epoxy resin used to create premium quality high build coatings, broadcast or trowel-applied surfacing systems
 - .1 Pull-off Strength (ASTM D4541): > 400 psi (2.7 MPa) with 100% concrete failure.
 - .2 Shore D Hardness (ASTM D2240): 78 - 82 at 7 days.
 - .3 Solid Content: ~ 100% (by volume) / ~ 100% (by weight).
 - .4 VOC Content (ASTM D2369): ≤ 50 g/L.
 - .5 Compressive Strength (ASTM C579): 7,250 psi (50 N/mm²) at 28 days.
 - .6 Flexural Strength (ASTM C580): 2,900 psi (20 N/mm²) at 28 days.
- E. Topcoat: Sikafloor 340 is an aliphatic urethane with excellent chemical resistance and UV resistance coating in [*Refer to Sikafloor color chart*] color with the following properties:
 - .1 VOC Content (ASTM D2369): ≤ 280 g/L.
 - .2 UV Light Resistance - Q-U-V Accelerated Weather Tester: Excellent
 - .3 Abrasion Resistance (ASTM D4060): 18 mg loss (CS-17 Wheel, 1000 gm load, 1000 cycles).
 - .4 Flexibility: Bent on 1/8" conical
 - .5 Gloss at 60°: 90
 - .6 Slip Resistance: Equivalent to ASTM D2047 Passes.
- F. Joint sealant: Sikaflex 2c.
- G. Colors: refer to Section 000200 Material Finish / Color Schedule.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive flooring system. Notify Architect/General. Contractor/Owner/Owner's representative if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Do not apply to substrate treatments for moisture, repair, or leveling not of the same Manufacturer.
- B. Surface must be clean, sound and dry. Remove dust, laitance, grease, curing compounds bond inhibiting impregnations, waxes and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.
- C. Concrete substrate to have a minimum compressive strength of 3,500 psi (24 MPa) at 28 days and a minimum of 215 psi (1.5 MPa) in tension at time of application.
- D. Substrate moisture
 - .1 Measure and confirm Substrate Moisture Content, Ambient Relative Humidity, Ambient and Surface Temperature and Dew Point.
 - .2 Confirm and record above values at least once every 3 hours during installation, or more frequently whenever conditions change (e.g. Ambient Temperature rise/fall, Relative

Humidity increase/decrease, etc.).

- E. Ensure concrete substrate conforms to the minimum requirements of the flooring manufacturer.
- F. Flooring system shall not be applied to sand-cement setting beds. Sand-cement beds shall be removed to structural concrete substrate and re-leveled/sloped as necessary to achieve grade and/or adequate drainage.
- G. Flooring system shall not be applied to asphaltic or bitumen membranes, soft wood, aluminum, copper or fiberglass reinforced polyester/vinyl ester composites.
- H. Application to glazed or vitrified brick and tile, structural wood, steel shall only be permitted with Manufacturer's written recommendation.

3.2 SURFACE PREPARATION

- A. Prepare surface to receive flooring systems in accordance with manufacturer's written instructions.
- B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants. Remove sealers, finishes, and paints. Remove unsound concrete by appropriate mechanical means.
- C. Concrete: Shall be cleaned and prepared to achieve laitance-free and contaminant-free, open textured surface by shot blasting or equivalent mechanical means (CSP level as per ICRI guidelines and manufacturer's written recommendation).
- D. Chemical Surface Preparation: Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer's warranty.
- E. Control joints and cracks: Provide repair and treatment of control joints and surface cracks utilizing manufacturer's standard materials and installation details.

3.3 APPLICATION

- A. Mix and apply material with strict adherence to manufacturer's written installation procedures and coverage rates.
- B. Follow Manufacturer's written recommendations on terminations and connections to walls, drains, doorways, columns and floor-to-floor transitions.
- C. Do not apply while ambient and substrate temperatures are rising.
- D. Apply resinous flooring with care to ensure that no laps, voids, or other marks or irregularities are visible, and with an appearance of uniform color, sheen and texture, all within limitations of materials and areas concerned.
- E. Match colors and textures of approved samples.
- F. Install cove base [...] high with [...] radius in accordance with manufacturer's written instructions.

3.4 CLEAN UP

- A. Disposal of this product, solution and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.
- B. Empty containers should be taken to an approved waste handling site for recycling or disposal.

3.5 PROTECTION

- A. Freshly applied material should be protected from dampness, condensation and water for at least 72 hrs.
- B. Beware of air flow and changes in air flow. Introduction of dust, debris, and particles, etc. may result in surface imperfections and other defects.
- C. Follow manufacturer's written recommendation with respect to cure, wait time and return to service.

END OF SECTION 039925

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Visual display bulletin board cabinet assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
 - 2. Show locations of panel joints.
- C. Samples: For each type of visual display unit indicated.
- D. Product Schedule: For visual display units.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Manufacturer's standard warranty to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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-Developed Index: 50 or less.

2.2 BULLETIN BOARD CABINET

- A. Bulletin Board Cabinet Assembly: Factory fabricated.
- B. Basis of Design: Subject to compliance with requirements specified herein, provide Claridge "Contemporary Series - #2041" Bulletin Board Cabinet, or comparable products by one of the following:
1. Manufacturers:
 - a. AARCO Products, Inc.
 - b. ADP/Lemco, Inc.
 - c. Best-Rite Manufacturing.
 - d. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 2. Assembly: Extruded aluminum cabinet with glazed door panels.
 - a. Heavy gauge rectangular extruded aluminum cabinet framing.
 - 1) Framing: 1-1/2 inches by 3 inches aluminum.
 - b. Doors: 2-panel, sliding tempered glass in aluminum frame, with finger pulls.
 - 1) Glazing: 3/16 inch tempered glass.
 - 2) Locks: Keyed tumbler lock.
 - c. Corners: Square.
 - d. Mounting: Surface mounted with Z-bar hangers.
 - e. Inside depth: 1-3/4 inches.
 - f. Width: 48 inches.
 - g. Height: 36 inches.
 - h. Finish: Clear Satin Anodize.
- C. Tackboard Panel: Fabric-faced tackboard panel on cork core underlay.
1. Fabric: Guilford of Maine Series FR710, color fast, soil and stain resistant.
 2. Fabric to meet ASTM E-84 Flame Tunnel Test Class "A" rating.
 3. Wrapped Edge: Wrap edge of cork tackboard panel with fabric facing.
 4. Color and Pattern: As selected by Architect from full range of industry colors.
 - a. Refer to Section 000200 Material Finish / Color Schedule.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.
1. Aluminum Finish: Clear anodic finish.

- E. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.

2.3 MATERIALS

- A. Cork board: Meets ASTM E-84 and MIL-C-15116-C, Type -1.
 - 1. Dimensionally stable.
- B. Particleboard: ANSI A208.1, Grade M-1.
- C. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
- D. Fiberboard: ASTM C 208 cellulosic fiber insulating board.
- E. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.
- F. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

2.4 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings.
- B. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- C. Factory-Fabricated Bulletin Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to bulletin board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls.

END OF SECTION 101100

SECTION 101416 - 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 others, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each plaque at least half size scale.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Plaque Schedule: Use same designations specified or indicated on Drawings or in a plaque or sign schedule.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CAST METAL WALL PLAQUES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Advance Corporation; Braille-Tac Division.
 2. A. R. K. Ramos.
 3. Gemini Incorporated.
 4. Matthews International Corporation; Bronze Division.
 5. Metal Arts; Div. of L&H Mfg. Co.
 6. Mills Manufacturing Company.
 7. Nelson-Harkins Industries.
 8. Southwell Company (The).
- B. Cast Plaque: Plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Plaque Material: Cast bronze.
 2. Plaque Thickness: 1/2".
 3. Finishes:
 - a. Integral Metal Finish: As selected by Architect from full range of industry finishes.
 - b. Background Texture: As selected by Architect from manufacturer's full range.
 - c. Background Color: As selected from Manufacturer's full range of standard colors
 - d. Integrally Cast Border Style: As selected by Architect from manufacturer's full range
 - e. Mounting: Concealed studs, non-corroding for substrates encountered.
 4. Clear Coat Finish: Semi-Gloss.
- C. Bronze Castings: ASTM B584, of alloy recommended by manufacturer and finisher for finish indicated.

2.2 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.
 2. Cast Aluminum Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque, unless otherwise indicated.

2.3 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 3. Conceal connections where they are inconspicuous.
 4. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
 5. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 2. Concealed Z-Clips: Remove loose debris from substrate surface and install clips in position, so that plaque is correctly located and aligned.
- C. Remove temporary protective coverings and strippable films as plaques are installed.

PARTNERS 21-146A/B
PLAQUES
101416 - 4

END OF SECTION 101416

SECTION 101423.16 - ROOM IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Room Identification Signs that are directly attached to the building.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For Room-identification signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples: Provide fully assembled full size sample for each type of sign product with colors and textures as specified.
- D. Sign Schedule: Use same designations specified or indicated on Drawings or in sign schedule.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in [the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.2 ROOM IDENTIFICATION SIGNS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Slide System", 9/16" thickness Modular Standard Sign System (as indicated on drawings) as manufactured by 2/90 Sign Systems Inc. (provide with tamper-resistant ends with spanner fasteners) or a comparable product by one of the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation.
3. APCO Graphics, Inc.
4. ASE, Inc.
5. ASI Sign Systems, Inc.
6. Best Sign Systems, Inc.
7. Fossil Industries, Inc.
8. Mohawk Sign Systems.
9. Stamprite Supersine; a division of Stamp Rite Inc.

- B. Panel Sign: Provide sign with smooth panel surfaces constructed with to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.
 - a. Subsurface Graphics: Subsurface ADA.
 - b. Color: As selected by Architect from full range of industry colors.
2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
3. Frame: Vertical retainers.
 - a. Material: Aluminum.
 - b. Profile: Square.
 - c. Corner Condition in Elevation: Square.
 - d. Finish and Color: As selected by Architect from manufacturer's full range.
4. Mounting: Surface mounted to wall with concealed anchors.

5. Size: As indicated on drawings.
6. Text: As indicated on drawings. Confirm with Owner prior to fabrication.
7. Lower Insert Material: Subsurface ADA
8. Upper Insert Material: Subsurface ADA
9. Window Insert (where indicated): Paper as selected from manufacturer's full range and clear Protective Lens. Color of channels of window insert as selected from manufacturer's full range.
10. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8mm) above surface with contrasting colors as selected from manufacturer's full range.

C. Refer to Signage Schedule for list of all signs.

2.3 PANEL-SIGN MATERIALS

A. Acrylic Sheet: ASTM D 4802, Type UVF (UV filtering).

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors.
2. Furnish stainless steel fasteners.
3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
 - b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
3. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

- C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Locate and install signs where indicated using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
 - 5. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent wall. Locate to allow approach within 36 inches (75 mm) of sign without encountering protruding objects or standing within the swing of the door. Coordinate exact location with overall plan layout to be submitted for review with shop submittal.
- B. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
- C. Remove temporary protective coverings and strippable films after construction is complete prior to turning over project to Owner.

END OF SECTION 101423

SECTION 102600 - IMPACT-RESISTANT WALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Corner guards - to be installed at all outside corners of gypsum board walls and where indicated.

1.2 RELATED SECTIONS

- A. Division 6 – Section “Rough Carpentry”: for wood support blocking
- B. See Division 8 Section "Door Hardware" for metal armor, kick, mop, and push plates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include sections, details, and attachments to other work.
- C. Samples: For each type of unit and for each color and texture required.
- D. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide engineered, impact-resistant, wall-protection units with with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:
1. Flame spread: 25 or less
 2. Smoke developed: 450 or less
- B. Impact strength: Provide wall protection components that have been tested for impact using a ram-type impact test in accordance with the applicable provisions of ASTM F476 -84.
- C. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall-protection units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Limited Lifetime Systems Warranty.

PART 2 - PRODUCTS

2.1 CORNER GUARDS (CG)

- A. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn or match angle of wall to match wall condition.

1. Basis-of-Design Product: Construction Specialties, Inc. "SM 20" series partial height Acrovyn corner guard (angle to match wall angle), or a comparable product by one of the following:
- a. American Floor Products Co., Inc.
 - b. ARDEN Architectural Specialties, Inc.
 - c. Balco, Inc.
 - d. InPro Corporation
 - e. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - f. Korogard Wall Protection Systems; Division of RJF International Corporation.
 - g. Pawling Corporation.
 - h. Tepromark International, Inc.

2.2 MATERIALS

- A. Extruded Rigid Plastic: High-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout.
- B. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive metal; security-type where exposed to view.
- C. Adhesive: Type recommended by manufacturer for use with material being adhered to substrate indicated.
1. Use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

2. Cover: Extruded rigid plastic, minimum 0.078-inch (2.0-mm) wall thickness;
 - a. Profile: Nominal 3-inch- (75-mm-) long leg and 1/4-inch (6-mm) corner radius.
 - b. Height: 4 feet (1.2 m).
 - c. Color and Texture: As selected by Architect from manufacturer's full range of solid colors. Multiple colors to be selected/coordinated by Architect to match adjacent wall color(s).
3. Retainer: Minimum 0.060-inch- (1.5-mm-) thick, 1-piece, extruded aluminum.
4. Top and Bottom Caps: Manufacturer's prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.
- B. Install impact-resistant wall-protection units 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.
 1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
- C. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- D. Remove excess adhesive using methods and materials recommended in writing by manufacturer.
- E. Install at all outside corners of gypsum board walls and where indicated on drawings.

END OF SECTION 102600

SECTION # 102641 BULLET RESISTANT FIBERGLASS PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

Bullet resistant fiberglass panels.

1.2 REFERENCES

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment.
- B. ASTM C 1172 - Standard Specification for Laminated Architectural Flat Glass.
- C. ASTM E119-98-Standard Test Methods for Fire Tests of Building Construction and Materials.
- D. MIL-P-46593A-Numerical simulation of ballistic impact on composite laminates.
- E. MIL-STD-622F-V50 Ballistic Test for Armor

1.3 ACTION SUBMITTALS

- A. Refer to Section 013300 Submittal Procedures.
- B. Product Data: Including manufacturer recommended installation instructions.
- C. Shop Drawings: Include plans, elevations, sections, details, attachment to other work.
- D. Samples: For each exposed panel type.

1.4 INFORMATION SUBMITTALS

- A. Product Test Reports: Indicating compliance with requirements
- B. Warranty: Sample of warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Refer to Section 01 78 00 Closeout Submittals.
- B. Maintenance data.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site with the manufacturer's UL Listed Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor.

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Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations provided by manufacturer. Do not install products stored in conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Workmanship Warranty: All materials shall be warranted against defects for a period of [1] year for the date of receipt at the project site. Provide certificates of manufacturer's standard limited warranty with closeout documents.
- B. Finish Warranty: Manufacturer's warranty against deterioration of factory finishes for the period of [1] year from the date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

- A. Basis of Design: Subject to compliance with requirements, provide TSS Total Armor Bullet Resistant Fiberglass Panels as manufactured by Total Security Solutions, Inc., 935 Garden Lane, Fowlerville, MI 48836, 866 734-6277. Attn: Sales Department, sales@tssbulletproof.com. Web: www.tssbulletproof.com; or comparable, and equivalent products by the following:
 - 1. ArmorCore, 302 S 27th St, Waco, TX 76710, Ph: 866.688.3088
 - 2. Fortified Estate, LLC, 1900 Jay Ell Dr., Richardson, Texas 75081. Ph: 844.656.3678
 - 3. Strongwell, 400 Commonwealth Ave., Bristol, Virginia 24201, Ph: 276.645.8000

2.2 BULLET RESISTANT FIBERGLASS PANELS

- A. Through the design, manufacturing techniques and material application, the bullet resistant fiberglass panels shall be made of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets
- B. Bullet Resistant Fiberglass will be rated and tested for UL 752 and NIJ—0108.01 at the Level indicated by the product selected.
 - 1. Rating UL 752, Level III
 - 2. Fire Rating: One Hour per ASTM E119-98
- C. Properties
 - 1. Standard Color: White
 - 2. Thickness: 0.450 inch for Level III, UL Rating
 - 3. Tensile Strength LW @ 25°C: 45K psi
 - 4. Tensile Strength CW @ 25°C: 40K psi
 - 5. Tensile Strength AVG @ 25°C: 3.75 x 10psi
 - 6. Flexural Strength LW @ 25°C: 16.8K PSI
 - 7. Flexural Modulus LW @ 25°C: 2.7 x 10 PSI
 - 8. Compressive Strength @ 25°C: 70K psi

- 9. IZOD Impact Strength: 52 lbs/in
- 10. Water Absorption: <1.4% by wt
- 11. Barcol Hardness: 50
- 12. Coefficient of Thermal Expansion: $2\text{in/in/}^\circ\text{C}\times 10^{-6}$
- 13. Thermal Conductivity: 2 BTU/HR/ft²/in/°F

2.3 FABRICATION

- A. Tolerances: All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to beginning installation, verify that areas have been prepared as required by the Contract Documents and architectural drawings, and Shop Drawings have been approved.
- B. Notify Architect of any unsatisfactory preparation that is responsibility of others.
- C. Clean and prepare all surfaces per manufacturers recommendations as required for achieving the best results for the substrate under the project conditions.
- D. Do not begin installation of material until all unsatisfactory conditions have been resolved and approved by Architect.

3.2 INSTALLATION

- A. Do not begin installation until areas have been verified and surfaces properly prepared in accordance with Drawings.
- B. Install in accordance with manufacturer's instructions and UL 752. Set all equipment plumb.
- C. Apply sealant in accordance with manufacturer's recommendations as indicated in installation instructions.
- D. Remove excess sealant and leave exposed surfaces clean and smooth

3.3 PROTECTION

- A. Clean and protect material from damage during ongoing construction operations. If damage occurs, remove and replace as required to provide voice ports in their original, undamaged condition.
- B. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements.

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- C. Provide final cleaning of product and accessories, removing excess sealant, labels and protective covers.

- D. Touch-up, repair or replace damaged products prior to Substantial Completion.

END OF SECTION 102641

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.

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1. Basis of Design: Subject to compliance with requirements, provide Larsen's Manufacturing Co., Architectural Series, Model #SS-2409-R3, (at all locations, unless otherwise noted) or equal product by one of the following:
 - a. Fire End & Croker Corporation;
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group;
 - c. Kidde Residential and Commercial Division, Subsidiary of Kidde PLC;
 - d. Modern Metal Products, Division of Technico Inc.;
 - e. Moon-American;
 - f. Potter Roemer LLC;
 - g. Watrous Division, American Specialties, Inc.
 2. Kitchen cabinet mounted extinguishers provide Larsen Model #SS-2712-RL, or comparable product by one of the manufacturers listed in paragraph 2.2.B.
- B. Cabinet Construction: Nonrated. Provide fire-rated cabinets when located in fire-rated walls.
- C. Cabinet Material: Stainless-steel sheet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
1. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Engraved.

- 3) Lettering Color: Black.
- 4) Orientation: Vertical.

K. Finishes:

1. Stainless Steel: No. 4.
2. Manufacturer's standard baked-enamel paint for the following:
 - a. Interior of cabinet.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Portable, hand-carried fire extinguishers .
 - 2. Mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 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.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Larsens Manufacturing Company; "MP5-A" (at all locations, unless otherwise noted) or a comparable product by one of the following:
 - a. Ansul; by Johnson Controls International plc, Building Solutions North America
 - b. Babcock-Davis.
 - c. Badger Fire Protection.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. Guardian Fire Equipment, Inc.
 - g. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - h. Kidde; Carrier Global Corporation.
 - i. Nystrom, Inc.
 - j. Potter Roemer LLC; a Division of Morris Group International.
 - k. Pyro-Chem.
 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
 3. Multipurpose Dry-Chemical Type: UL-rated 5 lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- B. Special Purpose Fire Extinguishers – Kitchen: Type, size, and capacity for each fire-protection cabinet and/or mounting bracket indicated.
 1. Basis of Design Product: Subject to compliance with requirements, provide Larsen's Manufacturing Company; "WC-6L" (at all locations indicated that are within the Kitchen space). Available manufacturers offering similar products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ansul; by Johnson Controls International plc, Building Solutions North America
 - b. Babcock-Davis.

- c. Badger Fire Protection.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. Guardian Fire Equipment, Inc.
 - g. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - h. Kidde; Carrier Global Corporation.
 - i. Nystrom, Inc.
 - j. Potter Roemer LLC; a Division of Morris Group International.
 - k. Pyro-Chem.
2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
 3. Special Purpose Wet-Chemical Type: UL-rated 6-liter nominal capacity, with a potassium acetate based, low-PH wet chemical in manufacturer's standard enameled container.
 4. Kitchen Fire Extinguisher: Provide Larsen's "WC-6L" or comparable product by one of the manufacturers listed in paragraph 2.2.B.1 at kitchen locations. UL Rated 2A:K.
- 2.3 MOUNTING BRACKETS (Provide at locations where cabinets are not specified.)
- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Mounting Brackets: Top of fire extinguisher to be at 42 inches (1067 mm) above finished floor.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Personal protection equipment (PPE), turn-out gear lockers.

1.2 PREINSTALLATION MEETINGS

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

1.3 RELATED SECTIONS

- A. Division 26: Electrical

1.4 REFERENCES

- A. ASTM A513 – Minimum properties of Electric-Resistance-Welded Carbon Allow Steel Mechanical Tubing
- B. ASTM A510 - Minimum properties of Wire Rods and Coarse Round Wire, Carbon Steel and Alloy Steel

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each run of metal lockers.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include locker identification system and numbering sequence.
- C. Samples: For each locker type and color specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.7 WARRANTY

- A. Locker Warranty: Manufacturers written warranty stating that failures in materials or workmanship will be repaired or replaced within 10 years from product installation.

1.8 QUALITY ASSURANCE

- A. Approved manufacturer shall have a minimum of five years' experience in the direct manufacture of wire gird metal lockers.
- B. Source Limitations: Obtain metal lockers and accessories from single manufacturer.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers with labels identifying product and manufacturer's name. Do not deliver lockers until spaces to receive them are clean, dry and ready for installation. Final wall and floor finishes must be complete prior to installation.
- B. Storage: Store materials in a clean dry area.
- C. Handling: Protect materials and finish during installation and handling to prevent damage.

1.10 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections.

1.11 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 TYPE 'A' - TURNOUT GEAR (PPE) LOCKERS

A. MANUFACTURERS

- 1. Basis of Design Product: Subject to the requirements below, provide "Wall Mount Storage System" by GearGrid Corporation (www.geargrid.com), Forest Lake, MN 55025, Toll-free 888-643-6694, or an approved equivalent product from one of the following manufacturers:
 - a. Ready Rack. (www.readyrack.com)

2.2 MATERIALS

- A. Steel Tube: ASTM A 513 steel tubing.
- B. Steel Wire Grid: ASTM C 510 cold drawn steel wire welded grid.

2.3 METAL WIRE GRID LOCKERS

- A. Model: Personnel Protection Equipment (PPE) Wall Mount, Turnout Gear Storage Lockers
1. Size:
 - a. Width: 20 inches
 - b. Height: 74.5 inches
 - c. Depth: 24 inches
 2. Construction: Units shall be welded at all applicable joints. Forming of metal shall be completed by standard cold-forming operations. Use of fasteners will only be required to allow for knock-down shipping, securing units to mounting surfaces, and on applicable accessories.
 - a. Vertical Dividers:
 - b. Outer Frames: 1.25" O.D. x 16-gauge wall thickness ASTM A513 steel tubing.
 - c. Inner Grid: .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern.
 - d. Inner Grid wires must be full length and width of inside vertical divider frame. Wires not running full length or width, thus creating exposed wire ends will not be acceptable.
 - e. Inner Grid wires must run horizontally and vertically creating a square or rectangular grid pattern only. Grid wires not creating a square or rectangular grid pattern will not be acceptable.
 - f. Inner Grid wires shall intersect and cross all perpendicular wires, and shall be welded at all intersections.
 - g. Back Panel:
 - 1) Required on each locker to protect the locker contents and wall substrate, as well as provide an additional panel for accessory attachment.
 - 2) Grid: 0.25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern
 - 3) Back panel must engage and be secured to vertical dividers via horizontal wires which extend into mounting holes pre-drilled in vertical dividers. Back panels are sandwiched between vertical dividers, preventing them from being removed after assembly is complete.
 - 4) Inner Grid wires must be full length and width of inside vertical divider frame. Wires not running full length or width, thus creating exposed wire ends will not be acceptable
 - 5) Inner Grid wires must run horizontally and vertically creating a square or rectangular grid pattern only. Grid wires not creating a square or rectangular grid pattern will not be acceptable.
 - 6) Inner Grid wires shall intersect and cross all perpendicular wires, and shall be welded at all intersections.
 - h. Shelves: (1) Upper, (1) Lower. .25" diameter ASTM 510 cold drawn steel wire resistance welded and cold formed. Upper shelf shall include an integrated 20-gauge steel bracket to accept a 2" x 16" name placard (not included).
 - i. Apparel Hooks: (3) per locker opening. .192" diameter ASTM 510 cold drawn steel wire

resistance welded, cold formed and powder coated. Apparel hooks must securely engage and snap onto side or back grid, to prevent unintentional disengagement of hook

3. Accessories: Provide the following:
 - a. Placard Channel: 20 gauge steel to accept a 2" x 12" name placard(not included), securely welded to inner grid panel
 - b. Hang Bar
 - 1) Hang Bars shall be manufactured to allow each locker user to install at their desired height. Hang Bars that span multiple locker openings are not acceptable.
 - 2) Tube: 1.25"O.D. x 16-gauge 304 stainless steel tubing.
 - 3) Brackets: Allow Hang Bars to be securely attached to each vertical divider, powder coated.
 - c. Heavy Hanger (1- each locker):
 - 1) 0.25" diameter 304 stainless steel wire cold formed and resistance welded.
 - 2) Black vinyl coating on hook end.
 - d. Gear Dryer Hanger (1-each locker):
 - 1) 0.25" diameter 304 stainless steel wire cold formed and resistance welded. Includes formed loops to prop open sleeves on jackets to promote better circulation throughout the garment.
 - 2) Black vinyl coating on hook end.
 - e. Glove Drying Hanger (1-each locker):
 - 1) 0.25" diameter 304 stainless steel wire cold formed and resistance welded.
 - 2) Black vinyl coating on hook end.
 - e. Helmet Holder (1-each locker):
 - 1) 0.25" diameter ASTM 510 cold drawn steel wire resistance welded. Powder coated finish in specified color.
 - f. Top Side Storage (optional):
 - 1) Shelf spanning across the top of the lockers for additional gear storage above lockers. .25" diameter ASTM 510 cold drawn steel wire resistance welded to a 3" square pattern. Powder coated finish in specified color.
 - g. Power Bar:

- 1) 16-gauge steel chase integrated into the upper framework of the locker assembly allowing provision for the installation of a 120VAC duplex outlet at each locker location. Powder coated finish in specified color.
- 2) Electrical service, receptacle outlet, and wiring – refer to electrical.

B. FINISHES

1. General: All system components excluding assembly and mounting hardware and stainless steel components are to receive the standard finish.
2. Paint Finish: Components to be cleaned using a phosphatized bath, clear water rinse and factory electrostatically applied, 3 to 4 mm, durable, UV stable powder coat paint. Meet or exceed specifications of the American Society for Testing and Materials (ASTM) standards.
3. Colors: Selected from manufacturer's standard available colors.
 - a. Refer to Section 000200 Material Finish / Color Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lockers. Notify architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers in accordance with manufacturer's instructions. Install lockers level, plumb, and true; shim as required, using concealed shims.
- B. Use manufacturer's hardware for assembly.
- C. Anchor to mounting surface with proper hardware.

END OF SECTION 105113

SECTION 107516 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes ground-set flagpoles made from aluminum.

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. Delegated-Design Submittal: For flagpoles.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

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, shall 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 90 mph (40 m/s) 3-second gust speed at 33 feet (10 m) aboveground.
 - 2. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: Cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).
1. American Flagpole; a Kearney-National Inc. Company.
 2. Concord Industries, Inc.
 3. Lingo Inc.; Acme Flagpole Division.
 4. Michigan Flagpole Inc.
 5. Rocket Enterprise, Inc.
- B. Exposed Height:
1. Two each at 25 feet.
 2. One each at 30 feet
- C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch (1.52-mm) wall thickness with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.

2.4 FLAGS

- A. Provide the following flags for outdoor use with UV protection, embroidered, lock-stitched, constructed of nylon:
1. United States of America; One (1), 5' x 8' in size.

2.5 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, Cam Cleat System: 5/16-inch- (8-mm-) diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
- C. Halyard Flag Snaps: Provide two swivel snap hooks per halyard.

2.6 MISCELLANEOUS MATERIALS

- A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- B. Sand: ASTM C 33/C 33M, fine aggregate.
- C. Elastomeric Joint Sealant: Single-component urethane or single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.7 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44.
 - 1. Color: Refer to 'Material Finish / Color Schedule Section 000200'.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
- D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
- E. Place concrete, as specified in Section 033000 "Cast-in-Place Concrete". Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.
- B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107516

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes manual single and dual roller window shades.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, details of installation, and relationship to adjoining Work.
 - 1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
- C. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items.
- D. Samples: For each exposed finish and for each color and texture required.
- E. Window Treatment Schedule: Use same designations indicated on Drawings.
- F. Maintenance data.

1.3 WARRANTY

- A. Manufacturers' standard 10 year warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.
- C. Comply with WCMA A 100.1.

PART 2 - PRODUCTS

2.1 ROLLER SHADES

- A. Products: Subject to compliance with requirements, provide one of the following:

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- B. Basis-of-Design Product: Vertical roll-up, single and dual roller window shade. Dual roller window shades will have different types of fabric on each roller. Housing will be extruded aluminum, including brackets, fasteners, and other components necessary for complete installation. Subject to compliance with requirements, provide shades as manufacturer by Draper, Inc. as follows or other manufacturers, listed below:
1. Single roller, manually operated, roller shades (Type 'RS-1'):
 - a. Draper, Inc. - Access Roller FlexShade.
 - b. Mounting: Concealed or Surface Mount, as indicated on drawings.
 - c. Provide with Sunscreen shade.
 2. Dual roller, manually operated, roller shades (Type 'RS-2'):
 - a. Draper, Inc. - Access Dual Roller FlexShade.
 - b. Mounting: Concealed or Surface Mount, as indicated on drawings.
 - c. Provide with dual shades – Sunscreen and Room Darkening.
 3. Subject to compliance with requirements, other manufacturers include the following:
 - a. Hunter Douglas, Inc.; Hunter Douglas Window Fashions Division.
 - b. Levolor; Levolor-Kirsch Window Fashions; a Newell Rubbermaid Company.
 - c. Lutron Shading Solutions by VIMCO.
 - d. MechoShade Systems, Inc.
- C. Shade Band Material:
- a. Sunscreen: SheerWeave Series PW4550, 5%
 - 1) Color: As designated on Material Finish / Color Schedule.
 - 2) Content: 17% polyester core, 83% vinyl on polyester.
 - 3) Material Openness Factor: 5 percent.
 - 4) Thickness: .025 in.
 - 5) Weight / Sq. Yard: 13.0 oz.;
 - 6) UV Fade: none; UV Tensile: 95 percent
 - b. Room Darkening: SunBloc Series SB9100
 - 1) Color: As designated on Material Finish / Color Schedule.
 - 2) Content: 25% fiberglass, 75% PVC coating
 - 3) Shading Coefficient: 0.25
 - 4) Material Openness Factor: 100 percent opacity.
 - 5) Thickness: 0.013 inches.
 - 6) Weight / Sq. Yard: 12 oz.
 - 7) UV Fade: none; UV Tensile: 96 percent
 - 8) Fire Classification (NFPA 701, NFPA 101): Class A
- D. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Chain-Retainer Type: Clip, jamb mount.
 2. Spring Lift-Assist Mechanisms: Provide for shadebands that weigh more than 10 lb (4.5 kg)] or for shades as recommended by manufacturer, whichever criterion is more stringent.
- E. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without

deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade.
 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
- F. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- G. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- H. Method of installation:
1. At locations where ceiling is directly adjacent to the shade housing, the unit is to be recessed in ceiling and surface mounted to wall with screws or other acceptable means of attachment. At these locations provide pocket-style headbox. Refer to drawings for locations.
 - a. Housing Case:
 - 1) Rectangular enclosure for two rollers fabricated from extruded aluminum with white paint finish and stamped steel end caps
 - 2) Housing designed to be installed separately from shade as part of ceiling system installation. Shade and operating mechanism can be site installed later after construction operations that might damage shade are complete.
 - 3) Closure panel: Bottom closure panel forms slot for passage of shades and is removable for access to shades and operating mechanisms.
 - 4) Bottom perimeter flange provides support and trim for acoustical ceiling panels.
 2. At locations where no ceiling is directly adjacent to the shade housing, the unit is to be surface mounted to wall with screws or other acceptable means of attachment. At these locations provide finished snap on fascia and end caps. Refer to drawings for locations.

2.2 ROLLER SHADE FABRICATION

- A. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
 3. Unit sizes are to be as indicated on the drawings or to the maximum size that the material permits to minimize the number of units. Units are to be symmetrical within all spaces when one unit will not suffice.
- B. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- C. Bottom shade slat: Minimum 1/8 by 1 inch (3 mm by 25 mm) aluminum slat encased in heat sealed hem.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Field verify window dimensions prior to fabrication.
- B. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 01 Section Demonstration and Training."

END OF SECTION 122413

SECTION 123216 – MANUFACTURED CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufactured casework, countertops and accessories.

1.2 RELATED SECTIONS

- A. Division 6 - Carpentry: Framing and blocking in walls, floors and ceiling to support equipment.
- B. Division 9 - Resilient Flooring: base for casework including floor cabinets and table legs.
- C. Division 12 – Solid Surfacing Countertops and Sills
- D. Division 22: Sinks, faucets, fittings, traps, stops, tail pieces, vacuum breakers, and other fixtures, electrical and mechanical runs and connections.
- E. Division 26: Connections for electrical service lines, wire and conduit to service fixtures.

1.3 REFERENCES

- A. ADA (ATBCB ADAAG): Americans with Disabilities Act Accessibility Guidelines.
- B. ANSI 208.1: Standards for Particleboard.
- C. Architectural Woodwork Institute (AWI): Quality Standards.
- D. NEMA LD 3: High Pressure Decorative Laminates.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Test reports certifying that the casework finish complies with manufacturer's standards for chemical and physical resistance performance requirements.
 - 2. Performance test reports from an independent testing lab on each specified top material.
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate locations of blocking and reinforcements required for installing casework.
 - 2. Include indicators of exposed conduits, if required, for service fittings.
 - 3. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other equipment.
 - 4. Include coordinated dimensions for equipment specified in other Sections or provided by Owner.

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- C. Certifications:
1. Submit certified product test data in accordance with ANSI A161.1, NEMA LD3, and general static load testing as specified, performed and certified by an independent testing agency.
 2. Submit certification stating that all casework will comply with AWI's "Architectural Woodwork Quality Standards".
 3. Material Samples: For each finish and each color selected.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference
1. Attendance: Contractor, installer and related trades.
 2. Review project conditions, manufacturer requirements, delivery and storage, staging and sequencing, and protection of completed work.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 5 years experience in the actual production of specified products. Submit documentation of plant facilities and capacity to provide casework for this Project.
- B. Installer Qualifications: Firm with 5 years experience in installation or application of systems similar in complexity to those required for this Project, plus the following.
1. Authorized distributor of manufacturer.
- A. Mockups:
1. Full-size base cabinet and wall cabinet.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Casework shall be protected in transit.
- B. Store products under cover in a ventilated building not exposed to extreme temperature and humidity changes prior to installation. Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction if applicable.

1.3 PROJECT CONDITIONS

- A. For delivery and installation of casework and equipment, building conditions shall comply with AWI Standard 1700-G-3 and 1700-G-4 and be as follows:
1. Flooring required to be placed under casework and equipment installed.
 2. Wood or metal blocking (wall grounds) installed within partitions to allow for immediate installation upon delivery.
 3. Heating and air conditioning systems providing consistent temperature and humidity conditions

to comply with by AWI Standard 1700-G-4 and 1700-G-5.

- a. Relative humidity not less than 40 percent, nor more than 60 percent.
 - b. Temperatures not less than 65 degrees F (18 degrees C) and not greater than 80 degrees F (27 degrees C) in areas of casework and equipment installation.
4. Overhead mechanical, electrical and plumbing rough-in work is complete.
 5. Wet operations complete prior to delivery.
 6. Ceiling grids (with or without ceiling tiles), overhead soffits, ductwork and lighting installed.
 7. Painting complete.

1.4 WARRANTY

- A. Casework Manufacturer Warranty: 5 years from date of delivery. Warranty is for the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly investigate and address said deficiencies.
 1. Defects in materials and workmanship.
 2. Deterioration of material and surface performance below minimum standards as certified by independent third party testing laboratory.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, provide manufactured casework by Case Systems, Inc. www.casesystems.com, or other approved equal product including but not limited to the following:
 1. TMI Systems Design Corporation.
 2. Or approved equal.

2.2 DESIGN

- A. Flush Overlay Door Design:
 1. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch (3.2 mm) reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet
- B. Interior woodwork grade: AWI, custom grade
- C. ADAAG, Americans with Disabilities Act Requirements: The following requirements shall be met.
 1. Countertop height: With or without cabinet below, not to exceed a height of 34 inches (864 mm) A.F.F., (Above Finished Floor), at a surface depth of 24 inches (610 mm).
 2. Kneespace clearance: Shall be minimum 29 inches (737 mm) A.F.F. at apron, and 30 inches (762 mm) clear span width.
 3. 12 inches (305 mm) deep shelving, adjustable or fixed: Not to exceed a range from 9 inches (229 mm) A.F.F. to 54 inches (1372 mm) A.F.F.
 4. Wardrobe cabinets: Shall be furnished with rod/shelf adjustable to 48 inches (1219 mm) A.F.F. at a maximum 21 inches (533 mm) shelf depth.
 5. Sink cabinet clearances: In addition to above, upper kneespace frontal depth shall be no less

than 8 inches (203 mm), and lower toe frontal depth shall be no less than 11 inches (279mm), at a point 9 inches (229 mm) A.F.F., and as further described in Volume 56, Section 4.19.

2.3 PERFORMANCE

- A. Casework shall conform to the following minimum performance requirements for static load performance:
1. Base cabinet construction/racking test: 800 lbs. (363 kg).
 2. Cabinet front joint loading test: 425 lb (193 kg).
 3. Wall cabinet static load test: 2,000 lb (907 kg).
 4. Drawer front joint loading test: 600 lb (272 kg).
 5. Drawer construction/static load test: 750 lb (340 kg).
 6. Cabinet adjustable shelf support device/static load test: 300 lb (136 kg).

2.4 MATERIALS AND COMPONENTS

- A. Laminated Plastics/Finishes:
1. High-pressure plastic laminate, .030 inch (.76 mm) in thickness, for exterior surfaces shall meet NEMA LD3-2000 VGL standards including thickness.
 - a. Exterior Color:
 - 1) Refer to 'Material Finish / Color Schedule Section 000200' for color selections
 - 2) Where wood grain laminates are used, direction of wood grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.
 2. Plastic Laminate Balancing Sheet: White high-pressure cabinet-liner, .020 inch (.051 mm) in thickness shall meet NEMA LD3-2000 CLS standards. Provide for balancing exterior surface laminates.
 3. Countertop High-Pressure Plastic Laminate:
 - a. High-pressure plastic laminate, textured finish .050 inch (1.27 mm) thickness.
 - b. Countertop Colors:
 - 1) As indicated in Material Finish / Color Schedule.
 - c. Heavy gauge neutral colored backing sheet for balanced construction.
 4. Pressure Fused Laminate (for concealed surfaces):
 - a. Melamine resin impregnated, 120 gram PSM minimum, thermofused to core under pressure.
 - b. Comply with NEMA LD3-2000 VGL standards and NEMA LD3-2000 CLS standards.
 - c. White pressure fused laminate for cabinet interiors behind door and drawers and interiors of all closed cabinets.
 - d. Balanced at all concealed surfaces with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.
- B. Core Materials: Particleboard, minimum 47 lb. (21.3 kg) density, of balanced 3-ply construction with moisture content not to exceed 8 percent. Particleboard shall conform to ANSI A208.1, Grade M-3.
- C. Edging Types:
1. 3 mm thick PVC: Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, automatically trimmed, inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design.

- D. Edging Locations. Provide the above specified edging types at the following locations, of the following colors:
1. Door/Drawer-Front edging shall be 3mm PVC.
 - a. Color selected by Architect to match adjacent laminates.
 2. Forward edge of cabinet end panel, top, bottom, door/drawer front spacer rail, interior dividers, and shelf shall be 3mm PVC.
 - a. Color selected by Architect to match adjacent laminates.
- E. Hardware
1. Hinges:
 - a. 2 ¾ inch, 5-knuckle steel reveal overlay, and hinges made from 0.095 inch thick metal with hospital tip. Two per door, except three per door for doors over 48 inches high, and four hinges for doors 67 inches and higher.
 - 1) Finish: Stainless Steel.
 2. Pulls: Comply with ADA requirements.
 - a. Wire design, 4 inches (101.6 mm):
 - 1) Finish: Stainless Steel.
 3. Drawer Slides:
 - a. Standard Drawers: Self-closing design, epoxy powder coated White, with positive in-stop, out-stop, and out-keeper to maintain drawer in 80 percent open position. Captive nylon rollers, front and rear. Minimum dynamic (operational) load rating of 100 pounds (45 kg) at 50,000 cycles.
 - b. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb (45 kg), zinc plated or epoxy coated at manufacturer's option.
 - 1) Provide body mounted molded rails for hanging file system for legal or letter size as indicated. Cutting or machining of drawer body/face not allowed.
 - c. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb (45 kg), zinc plated or epoxy coated at manufacturer's option.
 4. Catches: Catch shall provide opening resistance in compliance with the Americans with Disabilities Act.
 - a. Provide top-mounted magnetic catch for base and wall cabinet door. Provide two at each tall cabinet door. Catch housing shall be molded in White. LH-340ADA.
 - b. LH-345 Roller catch for mobile cabinets.
 5. Adjustable Shelf Supports: Design shall include keel to retard shelf slide-off, and slot for ability to mechanically attach shelf to clip. Load rating shall be minimum 300 lb (136 kg) each support without failure. Cabinet interior sides shall be flush, without shelf system permanent projection.
 6. Wardrobe Rod: Shall be 1-1/16 inches (27 mm) rod, supported by LH-363 flanges.
 7. Coat Hooks:
 - a. Double coat hooks, wall mount.
 8. Locks: Shall be 5 disc tumbler lock keyed alike and master keyed. Dull chrome finish. Lock core shall be removable.

2.5 CABINET CONSTRUCTION

- A. Workmanship:
1. Exposed exterior cabinet surfaces shall be .030 inch (.76 mm) high-pressure laminate. Laminate surface/balancing liner to core under controlled conditions by approved and regulated laminating methods to assure a premium lamination. Natural-setting hybrid P.V.A. Type III water resistant adhesives that cure through chemical reaction, containing no health or

environmentally hazardous ingredients, shall be used.

- a. Methods requiring heat are not allowed.
- b. "Contact" methods of laminating are not allowed.
2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components. End panels shall be doweled to receive bottom and top.
3. Back panel shall be fully bound (dadoed) into, and recessed 7/8 inch (22.2 mm) from the back of cabinet sides, top, and bottom to insure rigidity and a fully closed cabinet. Cabinet back shall be mechanically fastened from rear of body for tight interior fit and sealed with full-perimeter high-strength hot-melt adhesive.
4. Drawer bottom shall be fully bound (dadoed) and glued into and recessed 1/2 inch (12.7 mm) up from the bottom of sides, back, and sub-front. Sides of drawer shall be doweled to receive drawer back and sub-front.
5. 3/4 inch (19.1 mm) thick hang rails shall be mechanically fastened to end panels of all wall, base, and tall cabinets for extra rigidity and to facilitate installation.
6. All cases shall be square, plumb, and true.
7. Provide removable back panels and closure panels for plumbing access at sink cabinets, and where required.

B. Detailed Requirements for Cabinet Construction:

1. Sub-Base:
 - a. Cabinet sub-base shall be separate and continuous water-resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type jobsite construction of individual front, back, and intermediates, to form a secure and level platform to which cabinets attach. No cabinet sides-to-floor will be allowed.
 - b. Sub-base at exposed cabinet end panels shall be recessed 1/4 inch (6.4 mm) from face of finished end, for flush installation of finished base material by other trades.
2. Structural Cabinet Body:
 - a. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to ensure consistent sizing of modular components. Dowel end panels to receive bottom and top.
 - b. Cabinets over 36 inches (914 mm) wide shall be furnished with a mechanically fastened, yet removable, vertical divider to reduce horizontal member/shelf deflection. Wall cabinets shall have a clear inside nominal depth of 12 inches (305 mm) unless detailed otherwise.
3. Cabinet Top and Bottom:
 - a. Solid sub-top shall be furnished for all base and tall cabinets.
 - b. At cabinets over 36 inches (914 mm), bottoms and tops shall be mechanically joined by a fixed divider.
 - c. Exterior exposed wall cabinet bottoms shall be Pressure Fused white laminate both sides. Assembly devices shall be concealed on bottom side of wall cabinets.
4. Cabinet Ends:
 - a. Holes drilled for adjustable shelves 1-1/4 inches (32 mm) on center.
 - b. Exposed exterior cabinet ends shall be laminated with high-pressure plastic laminate, balanced with high-pressure cabinet-liner interior surface.
5. Fixed And Adjustable Shelves:
 - a. Thickness shall be 1 inch.
 - b. Shelves shall meet the loading/deflection standards of the National Particleboard Association.

6. Cabinet Backs:
 - a. Cabinet backs shall be minimum 1/2 inch (12.7 mm) thick, inset from rear of body, and fully bound (dadoed) four sides. Rear, unexposed, side of back perimeter shall be toe-nailed with mechanical fasteners for tight interior fit and direct connection of back panel to body, and sealed with full-perimeter high-strength hot-melt adhesive.
 - b. Provide 3/4 inch (19 mm) thick hang rails fastened to back/body as specified in this Section. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of 2 at base, 2 at wall, and 3 at tall cabinets.
 - c. Exposed exterior backs shall be high-pressure plastic laminate balanced with high-pressure cabinet-liner.
7. Door And Drawer Fronts:
 - a. Overlay Design: Laminated door and drawer fronts shall be 13/16 inch (20.6 mm) thick for all hinged and sliding doors. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch (3.2 mm) reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet. Laminated door and drawer fronts shall be 13/16 inch (20.6 mm) thick for all hinged and sliding doors.
 - b. Front Rail: Provide minimum 3/4 inch (19.1 mm) by 6 inches (152 mm) by full width cabinet body rails immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, close off reveal, and be locator for lock strikes.
8. Drawers:
 - a. Drawer fronts shall be applied to separate drawer body component sub-front.
 - b. Drawer sides shall be doweled and glued to receive front and back, machine squared and held under pressure to set.
 - c. Typical 1/2 inch (12.7 mm) drawer bottom, recessed, shall be fully bound (dadoed) into front, sides, and back. Routing, in drawer body for bottom, shall receive continuous glue.
 - d. Reinforce drawer bottoms with 1/2 inch (12.7 mm) by 4 inches (101.6 mm) front-to-back intermediate underbody stiffeners, mechanically fastened. One at 24 inches (610 mm), two at 36 inches (914 mm), and over.
 - e. Paper storage drawers shall be fitted with full width hood at back.
9. Vertical and Horizontal Dividers:
 - a. Natural hardboard 1/4 inch (6.4 mm) thick, smooth both faces. Secured in cabinet with molded plastic clips.

2.6 LOCKERS

A. Locker Construction

1. Locker construction shall match general casework section with the exception that all fixed shelves are 3/4" thick.
 - a. Locker top finish shall include a Finished Edge and Surface.

2.7 COUNTERTOP CONSTRUCTION

- A. Refer to Section 123661.16 – Solid Surfacing Countertops and Sills.

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PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not store or install casework in facility until concrete, masonry, drywall and plaster work is dry within limits acceptable to the casework manufacturer.
- B. Do not begin installation until substrates have been properly prepared.
 - 1. Walls and openings are plumb, straight and square.
 - 2. Concrete floors level within 1/8 inch (3 mm) level per 10 foot (3000 mm) run, non-accumulative, when tested with a straight edge in any one direction.

3.2 COORDINATION

- A. Verify site dimensions of cabinet locations in building prior to fabrication.
- B. Coordination with Mechanical, Plumbing and Electrical Contractors: Coordinate work of this Section with work of other Sections including but not limited to:
 - 1. Water, piping, electrical devices, and wiring.
 - 2. Installation of fittings according to Shop Drawings and manufacturer's written instructions.
 - 3. Setting bases and flanges of sink and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material.
 - 4. Anchorage of fittings and piping, unless otherwise indicated.

3.3 INSTALLATION

- A. Install casework in accordance with manufacturer's instructions.
 - 1. Installation of casework shall be plumb, level, true and straight, with no distortions.
 - 2. Use concealed shims as required.
 - 3. Where casework or equipment butts against other finished work, scribe and cut for an accurate fit.
 - 4. Lubricate operating hardware as recommended by the manufacturer.
- B. Install countertop and edge surfaces in one plane with flush hairline. Locate joints only where shown on Shop Drawings.
 - 1. Provide required holes and cutouts for service fittings.
 - 2. Seal unfinished edges and cutouts in plastic-laminate countertops with heavy coat of polyurethane varnish.
 - 3. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
 - 4. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 PROTECTION

- A. Inspect casework for damaged or soiled areas; remove, refinish, and touch-up as required.

- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.
- D. Remove cartons, debris, sawdust, scraps and similar items and leave spaces clean, and casework ready for Owner's use.
- E. Provide the services of a qualified manufacturer's representative to demonstrate operation and maintenance procedures of the installed casework and equipment to the Owners personnel.

END OF SECTION 123216

SECTION # 123553.15 - MODULAR STAINLESS STEEL CASEWORK

PART 1 – GENERAL

1.1 SUMMARY

- A. Includes all factory fabricated stainless steel casework as required by the project drawings.
- B. Section Includes:
 - 1. Base and wall units.
 - 2. Tall storage units.
 - 3. Recessed units.
 - 4. Pass through units.
 - 5. Knee space rails.
 - 6. Miscellaneous fillers and scribes.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation conference: Conduct at project site

1.3 RELATED SECTIONS

- A. Divisions 6 Wood and 9 Finishes: for in-wall backing and wall framing for anchorage support.
- B. Division 22 Mechanical - Plumbing.
- C. Division 26 Electrical.

1.4 PERFORMANCE REQUIREMENTS

- A. Casework and components shall withstand the following minimum loads without damage to components or casework operations:
 - 1. Base cabinets shall support a minimum of 500 lbs. per lineal foot suspended across cabinet ends.
 - 2. Drawers in a cabinet shall support a minimum of 100 lbs.
 - 3. Utility tables (with 4 legs) shall support a minimum of 300 lbs.
 - 4. Hanging wall cases shall support a minimum of 300 lbs.
 - 5. Shelves of base units, wall cases, and tall cases shall support a minimum of 100 lbs.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Submit complete shop drawings showing all casework, elevations, plans, cross sections, installation details, and attachments to other work including blocking and reinforcements required for installation.
 - 1. When locks are specified a complete keying schedule will be submitted with proposed

keying for review by Architect and Owner.

- C. Samples: Submit one typical wall and base unit for Architect and Owner review and acceptance. The sample, if approved, may be incorporated into the project.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Schedule delivery of casework and equipment so that spaces are sufficiently complete to allow for installation immediately following delivery.
- B. Protect finished surfaces from soiling or damage during handling and installation. Cover working surfaces with cardboard. Mark in large lettering "NO STANDING."

PART 2 – PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by LOC Scientific, modular stainless steel casework system.
- B. Modular cabinetry shall be of modern slim line styling with 1" wide vertical stiles and horizontal intermediate rails.
- C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers.
 - 1. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered. See Section 016000 "Product Requirements."

2.2 MATERIALS

- A. Cabinetry fabricated from stainless steel:
 - 1. T304 stainless steel sheet, (conforming to ASTM A240).
 - 2. All exposed surfaces polished to a No. 4 brushed satin finish. (150/180 grit.).
- B. Individual cabinets are to be rigid and self-supporting, modular in nature, for use interchangeably in a group of cabinets, or as a single unit.
- C. Top quality cabinetry to be ensured by the use of the proper machinery, tools, dies, and skilled workmanship in accordance with currently established standards of the laboratory furnishings industry. All cabinets and components are to be assembled utilizing jigs and fixtures as necessary to guarantee interchangeability of components between cabinets of like size.

2.3 CABINET HARDWARE

- A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

2.4 CONSTRUCTION

A. CABINET:

1. Cabinet backs, end panels, uprights, and toe base fabrication from 18 gauge stainless steel.
2. Top and intermediate horizontal rails and rear triangular gussets fabricated from 18 gauge stainless steel.
3. "L" shaped front corner reinforcement gussets and hinge reinforcements fabricated from 14 gauge stainless steel.
4. Bottom triangular leveler gussets fabricated from 11 gauge stainless steel.
5. All cabinets shall have a cleanable smooth interior. Front and rear reinforcing members, and channel shaped uprights shall be enclosed full height.
6. Front face joints fully welded, ground and polished to provide a continuous flat front plane free of crevices.
7. Front face of doors, drawers, and panels shall align flush with cabinet front, and shall not overlap case ends or top and bottom rails.
8. Cabinet openings for doors and drawers rabbetted to provide a dust resistant interior.
9. Base cabinets furnished with removable back panel for access to stops, valves, and service lines. No back panel furnished on cabinets with drawers only. Sink base cabinets furnished with lowered back panels (2/3 height) to accommodate sink, drain and service fixtures.
10. Wall and tall storage cabinets furnished with fixed back panel.
11. Base cabinets, wall cabinets, and tall cabinets up to 48" in width double-hinged doors, furnished without vertical center post to allow full access to cabinet interior.
12. Concealed horizontal rails furnished beneath all drawers, with or without locks.
13. Vertical stiles shall be provided between all doors and drawers, or tiers of drawers of all sectional cabinets.
14. All floor-mounted cabinets supported on (4) adjustable leveling glides.
15. Bottom shelf of base cabinets recessed, with sides turned up to contain spills within cabinet.
16. Bottom of base cabinets shall be removable for cleanability and access to leveling glides. Open or plugged holes in bottom of cabinets for access to leveling glides are not acceptable.
17. Top of toe space below bottom cabinet closed and finished flush.
18. Front corners of cabinets reinforced with "L" shaped reinforcement gussets.
19. Front top rails on cabinets over 30" in width reinforced with additional stainless steel angle shape for greater strength and rigidity.

B. DOORS:

1. All doors shall close against rubber bumpers.
2. All hinged doors less than 36" in height shall be hung by a minimum of two (2) hinges. Doors greater than 36" in height shall be hung with a minimum of three (3) hinges. Doors greater than 67" in height shall be hung by a minimum of four (4) hinges.
3. Hinged and Sliding Solid Panel Doors:
 - a. 3/4" thick, double wall telescoping box construction, with sound deadened interior.
 - b. Exterior pan fabricated from 18 gauge stainless steel.
 - c. Interior pan fabricated from 20 gauge stainless steel.
 - d. Hinges attached with stainless steel screws to 14 gauge steel reinforcing plates in case and door. Hinges welded to doors or cabinet bodies are unacceptable.

C. DRAWERS:

1. Drawer fronts 3/4" thick, 20 gauge stainless steel telescoping box construction, sound deadening interior.
2. Bottoms and sides of drawer formed from single sheet of 20 gauge stainless steel, coved at bottom. Body spot welded to drawer front.
3. Drawer shall close against rubber bumpers.
4. Drawer suspension – Typical, 100 lb. capacity, zinc-plated heavy duty full- extension telescoping slides with polymer ball bearings.
5. All drawers over 24" in width furnished with (2) drawer pulls.

D. SHELVES:

1. Adjustable intermediate shelves fabricated from 20 gauge stainless steel, with front and rear edges formed down and back 3/4". Ends formed down 3/4" for stiffness.
2. Shelves over 36" long reinforced with stainless steel hat channel stiffener running longitudinally along center of shelf.

E. KNEE SPACE RAILS AND DRAWER ASSEMBLIES:

1. Knee Space Rails: 4" high "C" shaped channel formed from 18 gauge stainless steel.
2. Drawers to be same as standard drawer unit previously specified, mounted in 4- 1/2" high, 18 gauge stainless steel four (4) sided frame.
3. Knee space rails and drawer assemblies designed for mechanical attachment to adjacent cabinets without exposed fasteners.

F. CLOSURE PANELS, SCRIBES AND FILLERS

1. Closure panels, scribes and fillers formed from 20 gauge stainless steel sheet, secured to cabinetry without exposed fasteners.

G. HARDWARE

1. Door Hinges –
 - a. 2-1/2" long stainless steel five (5) knuckle institutional type butt hinges with rounded ends.
2. Door Catches – Zinc plated adjustable nylon roller catch.
3. Hinged Door and Drawer Pulls –
 - a. Satin chrome plated wire pull, attached with screws on minimum 4" centers.
4. Drawer pulls shall be mounted horizontally and door pulls mounted vertically.
5. Solid sliding doors furnished stainless steel pull.
6. Solid sliding doors suspended by nylon-tired sheaves with steel bearings on extruded aluminum overhead track.
 - a. Bottom of doors held in alignment by removable stainless steel shoe.
7. Shelf Clips: Die formed stainless steel.
8. Leveling Glides: 3/8" – 16 mild steel 250lb capacity glide with minimum 1" adjustment.
9. Label Holders: (where shown on drawings, or as scheduled) 1" x 2-1/2" satin chrome plated finish, installed with screws. Stick-on Label holders not acceptable.
10. Locks: heavy-duty cylinder type 5- disc tumbler dull nickel plated, stamped with identifying number.
 - a. Provide on doors and drawers where shown on drawings, or as scheduled.

- 1) Key Quantity: Minimum of two keys per lock.
- 2) Master Key System: Key locks to be operable by master key.
 - a) Master Keys: Provide two.

2.5 COUNTERTOPS

- A. Countertops: Refer to Section _____.

PART 3 – EXECUTION

3.1 FABRICATION

- A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).
- B. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.
- C. Filler and Closure Panels: Provide where indicated and as needed to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework and with hemmed or flanged edges unless otherwise indicated.

3.2 INSTALLATION

A. Casework Installation:

1. Set casework components plumb, square and true in line; shim as required using concealed shims. straight with no distortion and securely anchored.
2. Screw continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerance.
3. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.
4. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches (400 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 - a. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than two fasteners per side.
5. Wall Cabinets: Secure wall cabinets to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches (400 mm) o.c.

6. Install hardware uniformly and precisely.
7. Adjust operating hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 ADJUSTING

- A. Repair or move and replace defective work, as directed by Owner's Representative upon completion of installation.
- B. Adjust Doors, drawers, hardware and other moving or operating parts to function smoothly.

3.4 CLEANING

- 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.
 1. Wipe down and vacuum clean interior of equipment.

3.5 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent exposure of casework and equipment from exposure to other construction activity during installation.
- B. Advise contractor of procedures and precautions for protection of installed casework from damage by workers from other trades.

END OF SECTION 123553.15

SECTION 123616 - STAINLESS-STEEL COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Stainless-steel countertops.
 2. Stainless-steel sinks.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For metal fabrications.
1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

- A. Countertops: Fabricate from 0.062-inch- (1.59-mm-) thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch (25 mm) over the face of the base cabinets.
1. Joints: Fabricate countertops without field-made joints.
 2. Weld shop-made joints.
 3. Sound deaden the undersurface with heavy-build mastic coating.
 4. Extend the top down to provide a 1-1/4 inch- (25-mm-) thick edge and return with a flange to face of cabinet body.
 5. Form the backsplash coved to and integral with top surface, with a 1/2-inch- (12.7-mm-) thick top edge and 1/2-inch (12.7-mm) return flange.
- B. Stainless-Steel Sinks: Fabricate from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope the sink bottoms to outlet without channeling or grooving. Provide continuous butt-welded joints.
1. Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
 2. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch (13-mm) diameter.

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3. Factory punch holes for fittings.
4. Provide sinks with stainless-steel strainers and tailpieces.
5. Factory weld sinks to stainless-steel countertops to provide one, integral unit.
6. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

2.2 MATERIALS

- A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.
- B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and the following:
 1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, acid-curing, silicone.
 2. Color: Clear.

2.3 STAINLESS-STEEL FINISH

- A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
- C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Seal junctures of countertops, splashes, and walls with sealant for countertops.
- F. Protection: Provide 6-mil (0.15-mm) plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 123616

SECTION 123661.16 - SOLID SURFACING COUNTERTOPS AND SILLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Solid surface material countertops, backsplashes, and end-splashes.
 2. Solid surface material apron fronts.
 3. Solid surface material window sills.
 4. Solid surface material thresholds.

1.2 ACTION SUBMITTALS

- A. Product Data.
- B. Shop Drawings: Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
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. Avonite Surfaces.
 - b. Corian,
 - c. Formica Corporation.
 - d. LX Hausys
 - e. Meganite Inc.
 - f. Wilsonart LLC.
 2. Type: Provide Standard type or Veneer type made from material complying with requirements for Standard type, as indicated unless Special Purpose type is indicated.
 3. Colors and Patterns: As selected by Architect from manufacturer's full range.
 - a. Countertop Color(s):
 - 1). Refer 'Material Finish / Color Schedule Section 000200' for color selections
- 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: Custom
- B. Configuration:
 - 1. Front: Beveled.
 - 2. Backsplash: Beveled.
 - 3. End Splash: Matching backsplash.
- C. Countertops: 1/4-inch-thick, solid surface material laminated to 3/4-inch-thick plywood with exposed edges built up with 3/4-inch-thick, solid surface material.
- D. Backsplashes and End splashes: Provide 1/2-inch-thick, solid surface material at locations where indicated on the drawings.
- E. Joints:
 - 1. Fabricate countertops without joints where possible.
 - 2. If the countertops are too large to be fabricated, shipped, and installed in one piece: indicate proposed joint locations on the shop drawings for review by the architect.
- F. Cutouts and Holes:
 - 1. Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves where undercounter fixtures are to be used.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material 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. Pre-drill 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 solid surface material manufacturer's written instructions.

- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- F. Install aprons to backing and countertops with adhesive.
- G. 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.
- H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

